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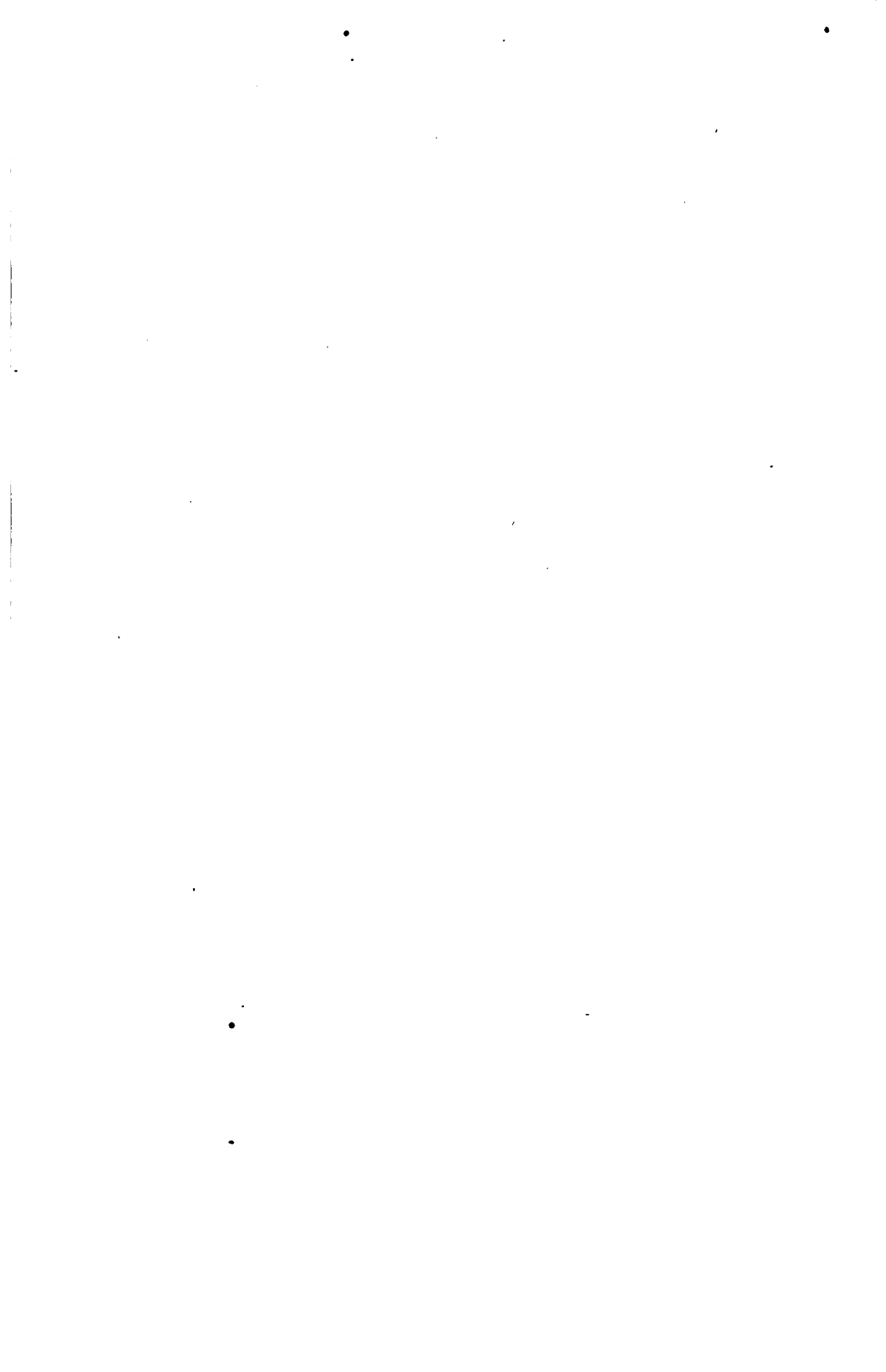
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7-33-3
THE COMMONWEALTH OF PENNSYLVANIA.

AGRICULTURE OF PENNSYLVANIA,

CONTAINING

REPORTS

OF THE

STATE BOARD OF AGRICULTURE,

THE

STATE AGRICULTURAL SOCIETY, THE STATE DAIRY-
MEN'S ASSOCIATION, THE STATE HORTICULTURAL
ASSOCIATION, AND THE STATE COLLEGE,

FOR 1890.

HARRISBURG:

EDWIN K. MEYERS, STATE PRINTER.

1890.

See 1532, 2

1532 + 1532.
1532 + 1532
1532 + 1532



EXTRACT FROM THE ACT OF APRIL 16, 1887.

"SECTION 1. *Be it enacted, &c.*, That from and after the passage of this act the printing, binding and distribution of the several public documents of this commonwealth shall be as follows:

* * * * *

"SECTION 15. Thirty-one thousand five hundred and ten (31,510) copies of the work entitled the 'Agriculture of Pennsylvania,' in the style, manner and form prescribed by law; eight thousand for the Senate, twenty thousand for the House of Representatives, one thousand five hundred for the State Board of Agriculture, five hundred for the State Agricultural Society, five hundred for the State Dairymen's Association, three hundred for the State Horticultural Association, fifty for the State College, one hundred for the Governor, sixty for the State Librarian for distribution and exchange with state and territories, and five hundred for reserve work.

AN ACT

To establish a State Board of Agriculture.

SECTION 1. *Be it enacted, &c.,* That the Governor of the Commonwealth, the Secretary of Internal Affairs, the Superintendent of Public Instruction, the Auditor General, the President of the State College, and one person appointed from or by such agricultural society in the state entitled under existing laws to receive an annual bounty from the county, and three other persons appointed by the Governor, with the consent of the Senate, shall constitute the State Board of Agriculture.

SECTION 2. One-third of the members appointed shall retire from office on the fourth Wednesday in January in each year, according to their several appointments. The vacancies thus occurring shall be filled in the same manner as above provided, and the persons thus appointed shall hold their office for three years from the expiration of the former term. Other vacancies may be filled in the same manner for the remainder of the vacant term.

SECTION 3. The Board shall meet at the capitol of the state at least once in each year and as much oftener as may be deemed expedient. No member of said board shall receive compensation from the state except for necessary personal expenses when engaged in the duties of the board.

SECTION 4. They shall appoint and prescribe the duties of a secretary of a board who may receive a salary not exceeding fifteen hundred dollars a year.

SECTION 5. They shall investigate such subjects relating to improvement in agriculture in the state, as they may find proper, and take and hold in trust, and exercise control over donations or bequests made them for the promotion of agriculture and the general interests of husbandry.

SECTION 6. They may prescribe forms for and regulate the returns from local agricultural societies and furnish the officers of each with such blanks as they may deem necessary to secure uniform and reliable statistics.

SECTION 7. They shall annually on or before the fourth Wednesday in January of each year, by their president or secretary, submit to the general assembly a detailed report of their doings, together with such recommendations and suggestions as the interests of agriculture may require.

SECTION 8. The secretary of the board shall in each year cause to be made and published for distribution as full an abstract of the returns from local societies as the board may deem useful.

SECTION 9. The secretaty shall have a permanent office at the capital under the control and supervision of the board, which shall be supplied and maintained at the expense of the state.

This act shall take effect on the fourth Wednesday of January next ensuing.

APPROVED—May 8, 1876.

FOURTEENTH ANNUAL REPORT

OF THE

PENNSYLVANIA STATE BOARD OF AGRICULTURE

FOR THE YEAR 1890.

MEMBERS EX-OFFICIO.

Hon. James A. Beaver, *Governor.*
 Hon. Thos. J. Stewart, *Secretary of Internal Affairs.*
 Dr. D. J. Waller, Jr., *Superintendent of Public Instruction.*
 Hon. Thomas McCamant, *Auditor General.*
 Dr. Geo. W. Atherton, *President Pennsylvania State College.*

APPOINTED BY THE GOVERNOR.

	<i>Term expires.</i>
Col. James Young, Middletown, Dauphin county, Pa.	1891
Hon. S. R. Downing, West Chester, Chester county, Pa.	1892
Hon. Will B. Powell, Springboro', Crawford county, Pa.	1893

ELECTED BY COUNTY AGRICULTURAL SOCIETIES.

		<i>Term expires.</i>
Adams	I. Garretson	1891
Armstrong	Noah Senor	1893
Beaver	A. L. McKibben	1893
Bedford	S. S. Diehl	1891
Berks	G. D. Stitzel	1892
Bucks	E. Reeder	1893
Butler	W. H. H. Riddle	1891
Bradford	R. H. Laning	1892
Blair	Frederick Jaekel	1892
Clarion	W. Shanafelt	1892
Chester	Thos. J. Edge	1891
Centre	Dr. E. W. Hale	1891
Clinton	J. A. Herr	1891
Columbia	Chandlee Eves	1892
Crawford	J. B. Phelps	1891
Cumberland	C. H. Mullin	1891
Dauphin	G. Heister	1891
*Delaware	Dr. E. Harvey	1893
Erie	J. C. Thornton	1892
Franklin	D. Z. Shook	1893
Indiana	W. C. Gordon	1892
Jefferson	J. McCracken, Jr.	1893
†Juniata	David Wilson	1891
Lackawanna	H. H. Colvin	1891
Lancaster	Calvin Cooper	1892
Lawrence	Samuel McCreary	1891
Lebanon	C. R. Lantz	1891
Lehigh	Dr. J. P. Barnes	1891
Luzerne	J. B. Smith	1893
Lycoming	P. Reeder	1891
Mercer	Robert McKee	1893
Montgomery	H. W. Kratz	1893
Montour	J. K. Murray	1892
Northampton	A. D. Shimer	1891
Northumberland	John Hoffa	1893
Perry	F. M. McKeahan	1891
Schuylkill	J. T. Shoener	1892
Somerset	N. B. Critchfield	1892
Sullivan	J. H. Lawrence	1891
Susquehanna	R. S. Searle	1892
Tioga	J. W. Mather	1892
Union	J. A. Gundy	1893
Venango	A. Frazier	1892
Warren	Chas. Lott	1892
Washington	John McDowell	1893
Wayne	N. F. Underwood	1892
Westmoreland	F. Y. Clopper	1892
Wyoming	N. G. Bunnell	1892
York	Dr. W. S. Roland	1892

*Died March 3, 1889.

†Died April 19, 1890.

OFFICIAL LIST.

President.

Hon. James A. Beaver (*ex-officio*).

Vice Presidents.

John McDowell,

N. F. Underwood,

Eastburn Reeder.

Executive Committee.

Hon. James A. Beaver,
J. A. Herr,
R. S. Searle,

G. D. Stitzel,
J. W. Mather,
Dr. W. S. Roland,

C. Cooper,
S. McCreary,
Thos. J. Edge (*ex-officio*).

Advisory Committee.

G. D. Stitzel,

Dr. W. S. Roland,
Thos. J. Edge (*ex-officio*).

Calvin Cooper,

Secretary.

Thos. J. Edge, Harrisburg.

Botanist.

Thos. Meehan, Germantown.

Pomologist.

Cyrus T. Fox, Reading.

Chemist.

Dr. Wm. Frear, State College.

Consulting Veterinary Surgeon.

Dr. R. S. Huidekoper, Philadelphia.

Veterinary Surgeon.

Dr. F. Bridge, West Philadelphia.

Microscopists and Hygienists.

Dr. H. Leffmann, Philadelphia,

Prof. C. B. Cochran, West Chester.

Entomologist.

Ornithologist.

Dr. B. H. Warren, West Chester.

Meteorologists.

J. L. Heacock, Esq., Quakertown.

Maj. Frank Ridgway, Harrisburg.

Apiarist.

Prof. G. G. Groff, Lewisburg.

Mineralogist.

Joseph Wilcox, Philadelphia.

Geologist.

Prof. J. P. Lesley, Philadelphia.

Stenographer.

H. C. Demming, Harrisburg.

STANDING COMMITTEES—1890.

LEGISLATION.

J. W. Mather, *Chairman*,
G. Hiester,
Joel A. Herr,
G. D. Stitzel,

H. W. Kratz,
G. W. Atherton,
R. S. Searle,
I. Garretson,

W. H. H. Riddle,
John McDowell,
J. A. Gundy,
Thos. J. Edge.

FORESTS AND FORESTRY.

Dr. W. S. Roland, *Chair'n*,
Thomas Meehan,
C. R. Lantz,
S. McCreary,

Dr. H. Leffmann,
Frederick Jaekel,
W. Shanafelt,
F. Y. Clopper,

W. H. H. Riddle,
J. W. Mather,
G. D. Stitzel,
W. C. Gordon.

CEREALS.

G. D. Stitzel, *Chairman*,
James Young,
G. Hiester,

I. Garretson,
A. D. Shimer,
J. A. Gundy,

E. Reeder,
John Hoffa,
F. M. McKeehan.

BIRDS AND MAMMALS.

Dr. B. H. Warren, *Chairman*,
G. B. Sennett,
J. B. Phelps,

N. B. Critchfield,
R. S. Searle,
C. Cooper.

J. A. Gundy,
J. W. Mather,
N. F. Underwood.

DAIRY AND DAIRY PRODUCTS.

E. Reeder, *Chairman*,
J. A. Herr,
Chandlee Eves,

N. F. Underwood,
I. Garretson,
N. B. Critchfield.

M. W. Oliver,
Dr. H. Leffmann,
Prof. C. B. Cochran.

FRUIT AND FRUIT CULTURE.

C. Cooper, *Chairman*,
G. D. Stitzel,
J. Hoffa,
J. A. Herr,

Chas. Lott,
J. H. Bartram,
J. E. Jamison,
G. Hiester,

C. T. Fox,
H. S. Rupp,
W. H. Moon,
Dr. J. Calder.

SORGHUM AND SUGAR CROPS.

R. S. Searle, *Chairman*,
Joel A. Herr,
I. Garretson,

Chandlee Eves,
W. B. Powell,
N. G. Bunnell,

John Hoffa,
J. C. Thornton,
H. H. Colvin.

APIARY.

F. M. McKeehan, *Chairman*,
David Wilson,
G. D. Stitzel,
J. A. Gundy,

N. F. Underwood,
John Hoffa,
N. B. Critchfield,
W. Shanafelt,

M. W. Oliver,
Dr. S. W. Morrison,
J. B. Cox,
Dr. G. G. Groff.

TEXTILE FIBERS.

J. McDowell, *Chairman*,
J. C. McNary,
W. A. Herriott,

George Wray,
J. Woodburn,
D. M. Campsey,

W. G. Berry,
J. W. Mather,
I. Garretson.

ENSILAGE AND FODDER CROPS.

J. B. Phelps, *Chairman*,
J. McCracken, Jr.,
Chas. Lott,

G. D. Stitzel,
J. C. Thornton,
N. B. Critchfield,

W. B. Powell,
W. Shanafelt,
Frederick Jaekel.

ROADS AND ROAD LAWS.

S. R. Downing, *Chairman*,
J. W. Mather,
C. Cooper,
J. B. Phelps,

H. W. Kratz,
J. A. Gundy,
N. F. Underwood,
J. P. Barnes,

F. M. McKeehan,
J. A. Herr,
J. C. Thornton,
A. Frazier.

OBITUARY.

Rev. E. E. HIGBEE, D. D., LL. D.

BORN MARCH 27, 1830.

DIED DECEMBER 13, 1889.

Rev. Elnathan Elisha Higbee, D. D., LL. D., *ex-officio* a member of the State Board of Agriculture, was born in Burlington, Vermont, March 27, 1830. When quite young he entered the University of Vermont, where he distinguished himself in a class of great ability and graduated with honor in 1849.

He taught school in his native state, before he was sixteen years of age. After graduation he resumed the work of teaching in Emmittsburg, Maryland, where he was employed as tutor in the family of Hon. Joshua Motter, whose daughter he afterwards married. He also taught a year as assistant teacher in the high school of Lancaster, Pennsylvania. Soon after he took up his residence at Emmittsburg he entered the Theological Seminary at Mercersburg, and was licensed to preach in May, 1854. In 1858 he became the pastor of the First Reformed church in Tiffin, Ohio, and at the same time served as Professor of Languages in Heidelberg College, located at that place.

In 1862 he took charge of Grace church, Pittsburgh, and in 1865 he succeeded Dr. Schaff as Professor of Church History and Exegesis at Mercersburg, and become president of the college in 1867.

He was first appointed State Superintendent of Public Instruction by Governor Hoyt, in April, 1881; he was re-appointed by Governor Pattison in 1885, and by Governor Beaver in 1889.

While attending a teachers' institute in Mifflin, he was stricken with paralysis on Tuesday, December 10, 1889, and on the following Friday he died, never having regained consciousness from the time of his first attack. He was buried at Emmittsburg, Maryland, and a suitable monument will be erected over his remains, the funds needed for this purpose having been contributed by the teachers and school children in whose behalf he had labored so earnestly and efficiently for many years.

He was a remarkable scholar, a born teacher, an eloquent speaker, a faithful public officer and a true friend.

OBITUARY.

PROF. DAVID WILSON,

BORN APRIL 7, 1813.

DIED APRIL 19, 1890.

Prof. David Wilson, late representative in the Board from Juniata county, was born near Lancaster, April 7, 1813, and died at his home near Port Royal, April 19, 1890, at the age of seventy-seven years.

In early life he learned the trade of a printer in Philadelphia, at the earnest desire of his mother he entered Jefferson College at Cannonsburg, for the purpose of studying for the ministry; after partially completing his college course he was convinced that the ministry was not to be the field of his future usefulness, and slightly modifying his college course he graduated with the highest honors of his class, and at once entered upon his lifelong work of teaching at Detroit, Michigan. In 1839 he removed to Juniata county and was appointed to the position of principal of the Tuscarora Academy at Academia. During the interval between 1839 and 1852, he continued in this position with the exception of two and one-half years during which he occupied a similar position at the academy at Lewistown. In 1852 he, in connection with Mr. Laughlin, opened Airy View Academy near what is now Port Royal; in 1876 he temporarily closed the academy but again opened it in 1880. He continued to live near Port Royal until the time of his death.

In referring to his success as a teacher, one who knew him well, testifies as follows: "Under the moulding influence of his instruction—religious, moral and intellectual, his pupils are found everywhere doing service for their country and generation. In every department of human enterprise; in the christian ministry; in the mission fields in distant lands among the heathen; in the army; in the higher and lower courts; in the legislature, and in the professors' chair and at the teachers' desk, his scholars are honorably represented to-day by those whose characters were formed and whose mental training was received from this wise teacher."

Another friend writes thus of him: "By nature and training he was fitted for the noble calling he followed, being a man of deep sympathies, undoubted integrity, firm convictions, courteous and urbane towards everyone in whatever station in life, a man of intelligence and culture and high christian character. To young men, whom he always loved, he was a wise counsellor."

One who enjoyed an intimate acquaintance with him, in referring to his success as a teacher, writes thus: "He was admitted to be not only a fine scholar, but also a gentleman of singular aptness to teach and of rare executive ability, and it is not surprising that under his management the school soon rose to a high standing and enjoyed uninterrupted success."

Although not present at the primary meeting of the Board, February 1, 1877, Mr. Wilson became a member at a subsequent session of the same year and presented his credentials at a meeting held May 22, 1877, and since that date he has served continuously as a faithful and zealous member, never flinching from any duty laid upon him and always present at our meetings when his health would permit. His last official duty was as chairman of the committee to prepare and present to the spring meeting of the Board, resolutions expressing the feelings of its members in relation to the death of Dr. E. E. Higbee, late Superintendent of Public Instruction, and *ex-officio* a member of the Board. During his last conversation with the writer he deeply lamented his inability to get this committee together at the close of the annual meeting in order that their duty might be performed properly and promptly.

PROCEEDINGS

OF THE

Pennsylvania State Board of Agriculture,

MINUTES OF THE ANNUAL MEETING,

Held at Harrisburg, Pa., January 22 and 23, 1890.

Board called to order at 9.15 a. m. by Dr. J. P. Barnes, vice president, in the chair.

Before calling the roll the secretary announced that, owing to the legal expiration of the terms of one-third of the members each year, vacancies existed in the counties of Armstrong, Beaver, Bucks, Chester, Jefferson, Luzerne, Mercer, Montgomery, Northumberland, Union and Washington, and that the names of members elect from these counties would not be called until their credentials had been acted on by the proper committee.

Present—Col. Young of Dauphin and Messrs. Garretson of Adams, Stitzel of Berks, Diehl of Bedford, Shanafelt of Clarion, Eves of Columbia, Phelps of Crawford, Hiester of Dauphin, Mullin of Cumberland, Wilson of Juniata, Cooper of Lancaster, McCreary of Lawrence, Barnes of Lehigh, Murray of Montour, McKeehan of Perry, Critchfield of Somerset, Lawrence of Sullivan, Searle of Susquehanna, Mather of Tioga, Lott of Warren, Underwood of Wayne, Roland of York, and secretary.

On motion of Mr. Mather of Tioga, Messrs. Wilson of Juniata, Eves of Columbia, Underwood of Wayne, Mather of Tioga, and Hiester of Dauphin, were named a committee of credentials.

On motion of Mr. Searle the reading of the minutes was dispensed with.

During the absence of the committee, Dr. H. P. Armsby made a report in relation to the action of the National Association of Experiment Stations, upon the resolutions adopted by the Board at the autumn meeting.

At the request of the secretary, Dr. Armsby explained the work of the Pennsylvania Experiment Station.

The committee on credentials reported the following persons as having been properly elected to represent their respective societies as members of the Board:

J. A. Herr, Clinton county ; Robert McKee, Mercer county ; Eastburn Reeder, Bucks county ; John B. Smith, Luzerne county ; John Hoffa, Northumberland county ; H. W. Kratz, Montgomery county ; John A. Gundy, Union county ; Thos. J. Edge, Chester county ; J. McCracken, Jr., Jefferson county ; John McDowell, Washington county.

They reported that W. R. Craighead had contested the representation from Washington county with John McDowell and they recommended that his necessary expenses be paid.

The committee also reported the following delegates as present with proper credentials :

Huntingdon Mills Farmers' Institute, F. A. B. Koons ; Perry County Farmers' Institute, Abraham Bowers, James Stephens and David Kister ; Lancaster County Agricultural Society, John H. Landis, Johnson Miller, W. H. H. Kiser, H. M. Mayer, W. H. Brosius, Joseph Witmer ; Western Pennsylvania Agricultural Society, W. G. Berry ; Horsham Farmers' Club, W. J. Kirk, J. Q. Atkinson ; Sullivan County Agricultural Society, W. Molyneux ; Goshen Grange of Chester County, Dr. B. H. Warren ; Brandywine Grange No. 60, C. B. Cochran, E. H. Walter ; Chamber of Commerce, Pittsburgh, Col. T. P. Roberts, J. B. Scott ; Pennsylvania State Agricultural Society, H. H. Branson ; Union Agricultural Society of Bradford County, T. S. Manly ; Dallas Agricultural Society, A. D. Hay ; Smythe Park Agricultural Association of Tioga County, J. A. Elliott ; Clarion county, Hon. J. H. Wilson, C. Brinker ; Berks County Agricultural Society, C. T. Fox, W. S. Ritter ; Washington county, W. R. Craighead ; Bradford County Agricultural Society, C. D. Derrah ; Dauphin county, H. C. Demming, John Motter ; Crawford County Agricultural Society, John Bolard ; Doe Run Farmers' Club, Mahlon G. Brosius ; Engineers' Society of Western Pennsylvania, A. Dempster ; State Horticultural Association, Edwin Davis ; committee also reported that Noah Seanor of Armstrong county appeared to have been elected by the proper agricultural society to represent that county in the Board of Agriculture, but did not present the proper certificate ; the committee therefore recommended that he be admitted to the rights of membership on condition that he shall furnish the secretary with a certificate in proper form.

On motion the report of the committee was adopted and the committee continued to act upon credentials presented at subsequent sessions.

On motion of Mr. Searle, seconded by Mr. Lawrence, the chairman named a committee of five on resolutions, consisting of Messrs. Mather, Reeder, McKee and secretary.

On motion of Mr. Herr, seconded by Mr. Smith, the Board proceeded to fix the place for the spring meeting ; Mr. Mather named Wellsboro' and Mr. Shanafelt Clarion ; a vote resulted in the choice of Wellsboro', and it was resolved to meet there at the call of the Executive Committee.

On motion of Mr. McKee the Board then proceeded to an election of officers for 1890.

The nominations for vice-presidents being open

Messrs. Reeder, Underwood, Eves, Riddle, Phelps, Searle and McDowell were named. The chair named Messrs. Lantz and Garretson tellers to conduct the election. A ballot having been ordered the tellers declared Messrs. McDowell, Underwood and Reeder elected.

Nominations for seven members of the Executive Committee having been called for, Messrs. Stitzel, Herr, McCreary, Mather, Searle, Lott, Phelps, Garretson, Murray, Cooper, Roland, Hiester and Riddle were named. A ballot having been ordered, the tellers announced that

Messrs. Herr, Searle, Stitzel, Mather, Roland and Cooper had been elected, and that there was a tie as to other members; a second ballot being ordered the tellers declared Mr. McCreary elected.

Thomas J. Edge having been nominated for secretary, Hon. C. R. Lantz of Lebanon was appointed to cast the ballot of the Board for him.

Mr. Hiester, chairman of the Executive Committee read the report of that committee, which called out discussion from Messrs. Roland, Hiester, Searle, Woodward, Gundy, Mather, Shanafelt and others.

Present—Messrs. Young, Garretson, Diehl, Stitzel, Reeder, Riddle, Shanafelt, Herr, Eves, Phelps, Mullin, Hiester, Wilson, Cooper, McCreary, Lantz, Barnes, Smith, McKee, Kratz, Murray, Hoffa, McKeehan, Critchfield, Lawrence, Searle, Mather, Gundy, Frazier, Lott, McDowell, Underwood, Roland and secretary.

On motion adjourned.

WEDNESDAY AFTERNOON, *January 22, 1890.*

Board called to order at 2.15 p. m. by Vice President John McDowell in the chair.

On motion, Hon. G. D. Stitzel of Berks read an essay in answer to the question "Has the Time Arrived when Pennsylvania Farmers should Soil their Stock?" the subject matter of which was discussed by Messrs. Cooper, Stitzel, Wilson, Phelps, Manly, Hamilton, Mahlon, Brosius, Searle, Young, Garretson, W. H. Brosius, Branson, Armsby and Frazier.

Calvin Cooper, member from Lancaster, read an essay on "Fencing as an Appendage to the Farms," which was discussed by Messrs. Wilson, Gundy, Searle, Branson, Mather, Berry, McCreary and secretary.

On motion of Mr. McKee, seconded by Mr. Reeder, the question of the fence laws of the state was referred to the Committee on Legislation for a report at the next meeting of the Board.

Prof. S. B. Heiges delivered an address on "Potatoes and Potato Culture;" discussion by Messrs. McWilliams, Gundy, Wilson, Cooper, Branson, Searle, Berry, Critchfield, Garretson, McKee, Smith, Brosius, Critchfield and others.

On motion adjourned.

WEDNESDAY EVENING, *January 23, 1890.*

Board called to order at 8.15 p. m. by Vice President McDowell in the chair, who introduced Luther S. Kauffman, Esq., of Lancaster, for the delivery of a lecture on "Our Interest Burdens".

On motion adjourned at 9.45 p. m.

THURSDAY MORNING, *January 23, 1890.*

Board called to order at 9.15 a.m. by Vice President John McDowell, who called His Excellency Governor Beaver to the chair:

On motion of G. D. Stitzel of Berks, the discussion of the address of S. B. Heiges, on "Potato Culture," was taken up; remarks were made by Messrs. Stitzel, Governor Beaver, Searle, Branson, Koons, Berry, Leshner, Smith, Manly, Hamilton and secretary.

Governor Beaver then addressed the Board on "The Roads and Road Laws of Pennsylvania," when, on motion, it was resolved that the essays on the programme should be read before the question of the roads and road laws of the state is discussed.

The following essays were then read, "The Public Road System of Pennsylvania," by N. F. Underwood, member from Wayne, and "The Road Laws of Pennsylvania," by J. A. Gundy, member from Union.

The questions of the road laws of the state was then declared open for discussion, which was participated in by Messrs. Wilson, Whawn, Haupt, Mantor, Young, Roberts, Dempster, Cooper, Garretson, Mather, Smith, Berry, McDowell, secretary and others.

On motion adjourned.

THURSDAY AFTERNOON, *January 23, 1890.*

Board called to order at 2.15 p. m. by Vice President John McDowell in the chair.

On motion, the chair named Messrs. Herr, Searle, Wilson, Gundy and Stitzel a committee to prepare and present resolutions expressing the sense of the Board in relation to the death of Dr. E. E. Higbee, Superintendent of Public Instruction and *ex-officio* a member of the Board.

On motion of the secretary it was decided to hold an evening session, to commence at 7.30 p. m.

On behalf of the Committee on Resolutions, J. W. Mather, chairman, presented the following, which were adopted without debate.

Resolved, That the State Board of Agriculture in convention assembled has heard, with pleasure of the efforts being made by the citizens of Philadelphia, Pittsburgh and elsewhere to collect data and encourage the movement for better roads in this commonwealth:

Resolved, That this Board respectfully recommends to the State Road Commission and other organizations and public-spirited citizens, to lend their hearty sympathy and coöperation to the move of the Philadelphia committee for better roads:

Resolved, That we do hereby urge upon the legislature the importance of speedily enacting such laws as will best promote the general improvement of the highways of the state.

Calvin Cooper, on behalf of the Executive Committee, reported that the committee had made the following appointments and nomination for which the confirmation of the Board was asked:

Advisory Committee—G. D. Stitzel, Dr. W. S. Roland. C. Cooper and Thomas J. Edge (*ex officio*).

The following names were reported as chairmen of the respective standing committees:

Legislation—J. W. Mather; Dairy and Dairy Crops—E. Reeder; Ensilage and Fodder Crops—J. B. Phelps; Wool and Textile Fiber—John McDowell; Cereal Crops—G. D. Stitzel; Roads and Road Laws—S. R. Downing; Sorghum and Sugar Crops—R. S. Searle; Apiary—F. M. McKeehan; Fruit and Fruit Culture—C. Cooper; Bird and Mammals—Dr. B. H. Warren; Forests and Forestry—Dr. W. S. Roland.

The following nominations by the secretary, as honorary officers, had been confirmed by the committee: Botanist—Thomas Meehan, Germantown; Pomologist—Cyrus T. Fox, Reading; Consulting Veterinary Surgeon—Prof. R. S. Huidekoper, Philadelphia; Veterinary Surgeon—Dr. F. Bridge, West Philadelphia; Microscopists and Hygeinists—Dr. H. Leffmann, Philadelphia, and Prof. C. B. Cochran, West Chester; Etomologist—(no nomination); Ornithologist—Dr. B. H. Warren, West Chester; Meteorologist—J. L. Heacock, Esq. Quakertown, and Maj. Frank Ridgway, Harrisburg; Apiarist—Dr. G.

G. Groff, Lewisburg; Mineralogist—Joseph Wilcox, Philadelphia; Geologist—Dr. F. A. Genth, Philadelphia; Stenographer—H. C. Demming, Harrisburg.

On motion the report of the committee was accepted and all nominations conformed.

Owing to the absence of S. R. Downing, on account of sickness, his essay on "The Durability and Economy of McAdam Roads," was read by J. A. Herr, member from Clinton.

John I. Carter then read an essay on "The Statistics of a Chester County Township," when the road question was declared open for discussion, which was participated in by Messrs. Carter, Phelps, Wilson, Frazier, Mahlon Brosius, W. H. Brosius, Hamilton, Miller, Ailman, Lott, Evans, Gordon, McCreary, White, Atkinson, Craighead, Smith and secretary.

On motion adjourned until 7.30 p. m.

THURSDAY EVENING, *January 29, 1890.*

Board called to order at 7.45 p. m. by Vice President John McDowell in the chair.

Mr. McDowell then called Vice President Reeder to the chair, and addressed the Board upon the road question.

Eastburn Reeder, member from Bucks, then read an essay on "Cross Ways and Ditches," and H. W. Kratz, member from Montgomery, one showing that "Good Roads are a Mutual Advantage to Town and Country."

On motion of Mr. Critchfield the road question was again declared open for discussion which was participated by Messer. Critchfield, Phillips, Garretson, Mantor, Leatherby, Manly, McCreary, Sener, Lott, McKeegan, Henry, Frazier, Eves, Kratz, Sloan, Witmer, Cooper and Searle.

Mr. Cooper of Lancaster then presented the following propositions for the action of the Board.

1st. Repeal the privilege of working out the road tax.

2d. Require the road commissioners to employ the necessary labor where they can get the best value for the money expended, giving the preference to resident labor.

3d. Require that other commodities of equal value with real estate pay their proportion of the necessary tax.

4th. Have some efficient head in each county to supervise and prepare plans and specifications.

After a full and free discussion, a vote was taken on each proposition separately, resulting in the unanimous adoption of the first, second and third, and the rejection of the fourth by a close vote.

On motion adjourned to meet at Wellsboro', at the call of the Executive Committee.

MINUTES OF THE SPRING MEETING.

Held at Wellsboro', Pa. June, 11 and 12, 1890.

WEDNESDAY, June 11, 1890.

Board called to order at 9.15 a. m. by Vice President N. F. Underwood of Wayne in the chair.

Present—Messrs. Garretson, Stitzel, Reeder, Shanafelt, Eves, Colvin, Cooper, McCreary, Barnes, Smith, Kratz, Murray, Hoffa, McKeehan, Lawrence, Mather, Gundy, Underwood, Roland and secretary.

The chair named Messrs. Roland, Kratz and Gundy a committee to receive and report upon the credentials of members-elect and delegates.

The chair named Messrs. Roland, Barnes and McKeehan a committee to draft resolutions relative to the death of Dr. E. E. Higbee and Prof. David Wilson and present them for consideration at the opening of the afternoon session.

Dr. Barnes then read obituary notices, prepared by the secretary, of Dr. E. E. Higbee and Prof. David Wilson, when, on motion, all remarks were deferred until after the report of the committee on resolutions.

On motion the Board then proceeded to fix the place for the autumn meeting when Mr. Stitzel named Gettysburg, Mr. Shook, named Greencastle; the secretary (on behalf of Mr. Critchfield), Somerset; and Mr. Shanafelt named Clarion.

On motion all voting upon the place for next meeting was deferred until Thursday morning.

The committee on credentials reported as follows: The committee report that D. Z. Shook of Greencastle, having presented a properly attested certificate of election to represent the Franklin County Farmers Association in the State Board of Agriculture, for three years from the fourth Wednesday in January, 1890, we recommend that he be received as a member of this Board.

Mr. George Hopwood of Uniontown, having presented a letter claiming to have been elected to represent the Fayette County Agricultural Association, but not being properly certified to, we recommend that action on his election be postponed until the certificate is presented upon one of the blanks furnished by the Board. W. S. ROLAND, J. A. GUNDY, (Signed) H. W. KRATZ.

On motion of Mr. Eves of Columbia, the secretary was directed to have printed and distributed a list of the members of the Board and of the honorary officers.

On motion of Mr. Kratz it was resolved that hereafter all remarks in relation to deceased members should follow the reading of the usual resolutions.

On motion of Mr. Powell the secretary was directed to add to the list of those present at the meetings, the names of the wives of members when they were present.

Questions from the question box were then answered and discussed.

On motion, Hon. John I. Mitchell then addressed the Board upon "The New West and the Older East," and was followed with remarks by Messrs. Gundy, Powell, Mather, Smith, Eves and secretary.

On motion adjourned to meet at 2 p. m.

WEDNESDAY AFTERNOON, *June 11, 1890.*

Board called to order at 2 p. m. by Vice President N. F. Underwood in the chair.

On motion of Mr. Riddle, Butler was added to the list of places proposed for the next meeting. On motion of Mr. Stitzel the name of Gettysburg was withdrawn, and, on motion of Mr. Shanafelt, the name of Clarion was also withdrawn, leaving Butler and Greencastle as proposed.

His Excellency Governor Beaver then took the chair, and, on motion, the order of business was suspended and J. W. Mather welcomed the Board to Wellsboro', as follows:

In bidding you a welcome to our town and our county I believe I express the sentiments of our entire people when I say we heartily welcome you and the members of this Board here to-day. We have, as some of the members have expressed it, "A beautiful town." We have a people that we think are as intelligent and as industrious as the people generally throughout the state according to our numbers; our county is large in territory. Agriculture has only begun in Tioga county; thousands and thousands of acres of our land are unimproved but year after year as you traverse these mountains it will be seen that they have been stripped of their timber; that manufactories have been established and we have within our borders the largest tannery in the country. Our timber supplies large manufacturing establishments in Williamsport. Our manufacturing industries and mines in this county are large, although I am sorry to say that to-day our mines are closed on account of strikes on the part of the miners, but as a people and as a farming community we are progressing year by year. Fifty years ago the first railroad was built in Tioga county for the sole purpose of transporting coal from Blossburg to the Erie canal. Since then other railroads have been constructed. At Morris Run, at Arnot, at Antrim, railroads have been built to transport this coal to market. The Beech Creek railroad and the Pine Creek railroad have been built passing through one of the most beautiful gorges in Pennsylvania and for sixteen miles there is hardly room sufficient for the creek to pass through. You have come here for a purpose, Mr. President, and that purpose is to teach our people, to instruct them, and we believe that those who have the time and take the pains to attend these meetings will be instructed and benefited by the attendance. It has been said that a man that teaches another to think is entitled to a monument. We believe that the State Board of Agriculture is a national institution; it is a body of men selected from different parts of this state and meets four times a year and devises different ways and means to advance farming, horticulture, and other industries in this state. If you teach our people to be more liberal with themselves, not to be selfish, if you teach the people of Tioga county as well as other counties that they should not deprive themselves of the benefits that they can have you will be doing a noble work so that the children, especially the girls of this state, may learn that they should not live to be kept but to be self-supporting and self-sustaining; that they should be able when they come to mature years to support themselves, and that every young man should know how to provide for himself. As we heard this forenoon the discussion as to how men should conduct business in a business way to be the most profitable to them, to make the most of property and life, so this body in its deliberations will teach us of Tioga county how to make the most money and how to live the most contented lives and be most happy in our homes.

On behalf of the Board, Governor Beaver replied as follows:

I notice by programme that the duty has been assigned to me to respond to the address of welcome and it is a pleasant duty to me, as it generally is. For myself, I may say, and I speak for the other members of the Board, that it is a great pleasure to be in Tioga county. My experience heretofore has been that it has always been a pleasant thing to come into this northern latitude of our state, and it is especially so now to come from the low lands of the state and breathe the pure air of the high lands of this latitude. Coming up this morning my attention was called to the many clearings to be seen on all sides; my neighbor, who was sitting near me, was not very complimentary as to the character of the soil being cleared. I had just been reading a moment before a reply to the article which was going the rounds of the newspapers as to the decadence of the farming interests in New England and it occurred to me as I saw these new clearings, and as I see them everywhere in Pennsylvania, that the modern cry of agricultural depression did not find very much foundation in the facts. As we see them around us the fact is that agriculture is increasing; the acreage of cultivated land is increasing; the amount of grain that is gathered from each acre is increasing; the number of people who are getting a good living from the soil is increasing; the number of men who are receiving comfort out

of their contact with the soil is increasing. It may be true for the time being that the value of land is decreasing, so much the better for the man that wants to buy if it is worse for the man that wants to sell. It is not the worse that it is an unmixed evil that this is so, and yet it is an unhealthy sign in discussing the facts and reasons which underlie the facts as they are given to us time after time as to the decadence of farming. For my part I don't believe it. I admit we don't raise as much wheat in Pennsylvania as we once raised. They do not raise as much corn in New England as they once raised, yet they are cultivating more acres in Pennsylvania and in New England than formerly and getting more profit and more good living is derived by the men who are cultivating those soils than ever before. This is not the usual line in which we discussed agricultural interests, I know. There is another side to it and it is a side that is discussed, and that is, that our landed interests, our agricultural interests, bear an undue portion of the taxation and bear greater burdens than any other interest in the community, and yet there are reasons even for that. The legislature, whether wisely or not, I don't say wisely, has made a very important exception as to the property which is to be taxed in Pennsylvania and they say by that exception that our manufacturing industry, except the real estate which is employed in our manufacturing establishments, shall not be taxed; and the reason is given for that, I can't say that I agree with the reason, but it is urged upon all sides and it has heretofore been of such weight that the legislature accepts them, and that unless this concession is made, more than one-half of which never pay, that the capital that is invested in them will go to other states, and the reason given is, that the more you employ men outside of agriculture the more you increase the income of the men engaged in agriculture. That is, the more you take away from the cultivation of the soil and the more you feed the more remunerative it becomes for those engaged in agricultural pursuits. I am told that the farmers of Tioga county are to-day feeling the influence of the strike in the bituminous coal regions. This is the season of their truck farming; it is the season when the garden truck finds a ready market in the coal regions, but when wages stop, when difficulties come to such a pass between employer and employé and work is stopped, the wages of the men employed is stopped and then the farmer feels the want of his market. Just follow that a little further and you will see the result: Suppose instead of two months of a strike or three months you abandon it altogether, what result follows? suppose instead of shutting down the manufacturing establishments for a short time we abandon them and suppose that two-thirds of our population employed in these industries were turned into agricultural pursuits, what does agriculture become? utterly valueless except as a mere mode of securing a scanty subsistence from the soil. But when we can put one-third in the tilling of the soil and put two-thirds in other occupations, so that their bodies may be nourished by the one-third, then we make agriculture remunerative, and the nearer we can bring our home market to us, the nearer we can bring our manufacturing industries to the farms, the more valuable it will become. We will not raise more wheat or corn, as they can do it cheaper in the west, but we will resort to dairy farming, truck farming, and such farming as will be most remunerative and those modes of farming which will give a ready and remunerative market at home. Pennsylvania becoming, as it is becoming, a mining and manufacturing state, we are not giving as many acres to wheat, oats, corn and hay as we otherwise would do, yet we are tilling more acres and securing more dollars than before. Chester county never did better than now as I am informed. Dauphin county, where I have some knowledge on this subject, I am sure never did as much as she is doing now: A little forty acre farm that I know of three miles from Harrisburg brings one thousand dollars cash rent besides giving a good living to the tenant. To be sure every acre is fertile land, every acre is alluvial soil, but you bring a farm like that close to the town then you will have profitable agriculture, and if you can multiply towns all over the state then you make agriculture a successful occupation, and that is one of the reasons that the legislature gives for exempting manufacturing capital from taxation. The reasoning is good, whether it should prevail to the extent it does I am not ready to say. I have never been an enthusiastic convert to that doctrine and yet it has two sides to it. The remark which my neighbor made back of me as we came up the railroad this morning was this as we saw the hillside cleared and the brush ready for burning, he says: "The man who lives on that will have a scanty living;" and I says: "The man shows that he has confidence in it;" he says, "that is pretty thin soil, I would not like to risk a living off of that." That led me to another thought, that whilst we are speaking of agriculture as an occupation and as one that does not pay we must take into consideration that he begins to count his profit where the other man stops; he don't count his labor as being remunerated; he don't count the living as part of the return that comes from the soil. The great majority of the other men engaged in other pursuits work the year around and if they come out in the end of the year with what they can eat and what they can wear they are content. Our farmers count the eating and the drinking nothing. The great majority are well satisfied if we can get what we can eat, drink and wear, but many of our farmers look beyond that, and unless they can lay by a profit from their agriculture they are not content and farming does not pay. This is one reason we hear so much about farming not paying and why so many are driven away from agriculture because it does not pay.

It pays in many ways which I need not recount, but the remark of my neighbor led me to this thought and it ought to be discussed more than it is, and we ought to dwell more on the enjoyment that there is in contact with the soil; the living that is assured to the cultivator of the soil, and then the leisure that comes more or less in the winter when the farmer has plenty of time for social enjoyment and other purposes. If we dwell on these different sides of farming I think there would be more encouragement to our young people to stick to the farm.

I think the time is coming when the returning tide from the west will restore our prices of ten or fifteen years ago and it will make our farmers more independent and at the same time make it more attractive. The time is coming when this northern section will be in advance of the present, when they will give the subject of grazing and the making of butter and cheese more attention. I believe that that kind of farming in this northern section will become entirely remunerative and our farmers will find there is no loss in that kind of farming.

We have all sections of our state represented here: Chester with its dairymen; Lancaster with its tobacco; the central part with its grain raising; some counties in the southern part of the state given to fruit raising, and we have found that in Franklin county and Juniata county that peach raising is as profitable as in Maryland and Delaware, and we are beginning to diversify our business on the farm which will therefore improve all the conditions of the people.

I am here for all the purposes for which I can be used but my time for the afternoon session is to be very limited. I am glad to see that we have for discussion this afternoon several important subjects which will be discussed by men who are familiar with them and who have given much thought to them.

The road question is attracting a great deal of attention on the part of our people and I am glad it is to be discussed. I expect to take a sixteen-mile drive across Tioga county and I will be better able to discuss that matter after I come back. A hospital is in the course of construction in Blossburg and I expect to drive there and see the building and will return and be with you at the evening session.

Let me say to the good people of Tioga county that it is pleasant for us to be here among you and enjoy this beautiful June day in this northern tier, a locality as celebrated as any part of the state. We are very sure that when the bark is all peeled and the hemlock and pine is all in that the time will come when every acre that is tillable will be employed in feeding the mouths of those who are engaged in manufacturing pursuits.

The topics before you are for your discussion and I have no doubt they will be instructive to you as well as the members of the Board who come here from all parts of the state. Personally it is a great pleasure to be here, and I will say that if the other members of the Board have been treated as hospitably as I have been they will go away well pleased and gratified with their visit. I am very glad to say to the citizens of Tioga county that the members of this Board have come here with very much pleasure and I am sure that their stay will be a great gratification to them, and I hope they will go away from this county with a better knowledge and appreciation of your agricultural resources.

Dr. Roland, on behalf of the committee to prepare resolutions of respect to the memory of Dr. E. E. Higbee and Prof. David Wilson, presented the following:

WHEREAS, This Board has learned of the death of Rev. E. E. Higbee, D.D., LL.D., *ex-officio* member of the State Board of Agriculture and late Superintendent of Public Instruction, which office he filled with great ability from the year 1881 to December 1, 1889, the time of his death:

Resolved, That by the death of Dr. Higbee the State Board of Agriculture has lost an honored and much respected member, and our state a valued and highly esteemed public educator; his ardent desire for the advance of education and the interest which he took in its appointments will be seen in the future.

Resolved, That we hereby express our condolence and deep sympathy with his respected and much esteemed family.

Resolved, That the resolution be enrolled on our minutes and that a copy of the same be forwarded to his family.

(Signed)

W. S. ROLAND,
J. P. BARNES,
F. M. McKEEHAN,
Committee.

"WHEREAS, In obedience to the inexorable law of nature, by which in humble submission we recognize the will of the power of Almighty God, the term of life of Prof. David Wilson, late fellow member of this Board, is ended, his earthly work is finished and he is laid to sleep in death.

Resolved, That by the death of Prof. Wilson we are called upon to mourn and regret the loss of a distinguished member, one whose life and character was marked by courtesy and kindness. He was a generous, reliable, intelligent and highly esteemed friend.

Resolved, That the Board has lost a valuable member; an able and industrious worker, of undoubted integrity, of great moral worth and high christian character, who, by his gentlemanly deportment and scholarly attainments, commended the highest respect of his fellow members.

Resolved, That we sympathize with the family of the deceased in their bereavement and that a copy of these resolutions be sent to them."

(Signed)

W. S. ROLAND,
J. P. BARNES,
F. M. McKEEHAN.

The chair (Gov. Beaver) having called upon the members for an expression of feeling in relation to the resolutions, responses were made as follows;

Dr. J. P. BARNES, member from Lehigh. The subject now under consideration, David Wilson, Ph. D., who, as a member of the State Board of Agriculture, has been continuously associated with us from the year 1877 up to the time of his death, after a short illness of pneumonia, following an attack of the grip; he died on the 19th day of April ultimo, aged seventy-seven years.

He was a man of good moral character, a christian faithful to his Master, the "Lord Jesus Christ." The records of Huntingdon Presbytery of 1843 state that he asked and was taken under the charge of said Presbytery as a candidate for the ministry, and remained as such until the spring meeting of the Presbytery in 1846, when, at his own request, his name was withdrawn from the list of such candidates. I have no doubt but he concluded that teaching was his appropriate sphere, and he had concluded to make it his life calling.

I learn from an obituary published in the *Juniata Herald* that he started out by learning the art of printing and worked at the same for several years in Philadelphia. Subsequently he entered Jefferson College at Canonsburg, from which he graduated with the first honor, out of a class consisting of some forty or more classmates. In 1839 he was teaching in Juniata county, he being the first principal of Tuscarora Academy, which position he held until 1852—except about two and a half years, during which time he was principal of Lewistown Academy, after which he went to Airy View Academy near Port Royal, where he continued until 1876, when the death of his beloved wife well nigh caused him to retire from teaching for good. Her death was followed by the death of two of his interesting daughters in close succession, and only about a year subsequent to that of their mother. He again resumed teaching with a succession of assistants or co-principals. Mr. Wilson had about completed his life work. The spirit was still willing but the flesh was weak. But still he manfully kept up his superhuman but one-sided struggle against fate, until pecuniary reverses and the

death of his only son, Winfield S., one of the brightest and most successful lawyers at the Allegheny bar, last year, seemed to crush all life and vitality out of him. Since then he has existed rather than lived in such a physical condition, he was unable to resist the disease that caused his death. But, nevertheless, his life has not been in vain. As an instructor he had few equals and no superior. His mission in life was a grand success and he has left a record for active usefulness of which any man might be proud. During his membership of the State Board of Agriculture he filled positions of importance from the beginning. Such as chairman of important committees, as a member of the Executive Committee and was also elected to the highest position to be bestowed by the Board, that of vice president, all of which he filled with credit and faithfulness.

His intelligence would prompt him to discuss subjects under consideration at our meetings with more than usual penetration, drawing out important information, and at the same time giving thorough knowledge to the members of the Board. His remarks were usually to the point and profitable to the hearers.

He has passed away, no more to meet with us here on earth, his usual presence in our midst will be no longer realized.

Truly a great and good man has fallen; peace be to his ashes.

Out of about a dozen persons who at the same time of Prof. Wilson became members of the State Board of Agriculture in May, 1877, now but two remain as members of the Board. These are Eastburn Reeder of Bucks county, and myself, from Lehigh county, both of whom are present here to-day.

Dr. W. S. ROLAND, member from York. Death has again invaded the ranks of the State Board of Agriculture.

At the first spring meeting of the Board, held in Harrisburg, May 22, 1877, Professor David Wilson, representing Juniata county, was admitted to membership in the Board, which position he continuously held until removed by the hand of death.

My first knowledge and acquaintance of the deceased dates back to that time now fourteen years ago, and in all my observation, intercourse and association with him during all these years, I have been brought to the conclusion, that he was a gentleman of the old school, possessed of a friendly disposition, candid, open-hearted, and always honorable, he was not given to ostentatious parade and show, but as rather of a quite and reserved nature, he was most heartily devoted to all the interests of the Board, and was always ready and prepared to take an active part in the business before it, his papers and discussions showed thought and ability, and his utterances were clear and forcible, independent in thought and decided in character, what he meant he said, and what he said he meant. He lived a useful life and died at a ripe age, remembered by his friends. The sympathies of the members of this Board, will go out to his bereaved family in the hour of their affliction.

I. GARRETSON, from Adams. With great surprise, and a saddened heart, I have learned of the death of our Brother, Jefferson David Wilson.

His name appears on the list of members of this Board in the first annual report published in the year 1877. Consequently he must be one of our oldest members.

We have lost a good, true and useful member of this Board. I have lost a true friend, for whom I had a warm affection. I mourn for him,

and this Board will feel the irreparable loss we have met with in his death.

He rendered long service in the work of this Board. He was a true gentleman. He never said an unkind word about any one; he was a noble character. He was weighed down by troubles of which only his friends knew, but he stood up manfully under them. Well do I remember our last meeting together at the annual meeting; he told of the sad bereavements he had met with, the loss of a loving wife and children, the last one, a son whom he looked upon as his comfort and support in his declining years, was called away from works to rewards.

The tears streamed down his care-worn cheeks, and in his sorrow he exclaimed, "My grief is so great, but I acknowledge it to be the will of a wise and gracious God."

I feel that his feeble health prevented him from writing his name high upon the tower of fame where it belongs. But what we have lost he has gained.

I feel that when he went through the dark river there was one went with him whose rod and staff comforted him, and that when he landed on the other side the pearly gates flew ajar, and he was welcomed by sweet music, and that now there is rejoicing in Heaven over a just man made perfect.

I revere his memory. Peace be to his ashes and may his many merits remain fresh in our memories.

F. M. McKEEHAN, member from Perry. Little did we expect when we met at the last meeting and congratulated Prof. Wilson upon his appointment in the Agricultural Department, Washington, D. C., for at that time he assured me that he felt as strong and vigorous as ever, that I should be requested by our honored secretary to offer some remarks upon his character and life at this meeting.

Upon my entering this Board, Prof. Wilson was the first member I met, and it seemed to afford him pleasure to have me become acquainted with the members. I became personally acquainted with the Professor when I moved to Port Royal in 1869, and, having resided nearly one and one-half years in the same town with him, I was unconsciously drawn toward him.

In our dealings and business relations I always found him upright, honest and consistent, reflecting the highest type of our christianity.

As a teacher his personal charms along with his graces, readily secured for him a place in the hearts of his students. With the courtesy of a gentleman he combined the dignity of a scholar. He was so well balanced in his whole nature that he carried all his gifts forward to a symmetrical development. Although having attained a good age and a scholar of the past, he kept well abreast of advanced thought.

Prof. Wilson had tender sympathies, indomitable will and fervent piety, which made him an exemplary citizen. His simple presence was a potent sermon. He had the strength of a mighty faith combined with the simplicity of a child.

In him we found a conspicuous absence of the ordinary frailties with which human nature is so liberally endowed. We do not say he was perfect. There was but one perfect. All his words and actions bore the stamp of sincerity.

He was indignant at falsehood and injustice, but his judgment was tempered in the most marvelous measure with patience and love. His modesty was so unwavering that few were fully aware of his exceptional attainments.

He was tender and gentle as a woman, yet had inflexible firmness of principle and conviction. He embalmed himself in all our hearts, and his name will be fragrant with pleasant memories forever. To intellectual ability of a high order he added a refined taste and most winning manners. We are touched and we are elevated by the blending beauty and pathos of such a life. Prof. David Wilson has gone, on unseen pinions, over the pathless sea, and we stand, as it were, at his open grave and ask ourselves which one of us shall follow in his wake? The Board has lost an efficient member. But we believe that death to him was the birthday of an eternal morning.

EASTBURN REEDER, member from Bucks. Again we are called upon to take note of the loss, by death, of a fellow member of the Board. Prof. David Wilson was one of the original twenty-six members, elected by county agricultural societies whose names are recorded in our first volume of 1877. During the thirteen years of his connection with the Board, he was always one of the most active and useful of our members. Trained in early life to be an educator of the young, qualified him to impart instruction to others. In his later years, and perhaps during his entire life, he devoted considerable attention to agriculture, and in all of its various branches he was well posted.

Of the entire twenty-six men who constituted this Board of Agriculture thirteen years ago, there are but six left who are now members of the Board. The change truly has been great in a time so short.

It should teach in this lesson, to do what we can while our opportunity lasts for "The night cometh wherein no man can work."

Silence is sometimes used as a mantle to cover ignorance, and sometimes it is the best expression of wisdom. It is well for us to know when to speak, and how, and when to be still.

Our late departed member, possessed this faculty, in my judgment, to an eminent degree. Human life is a great mystery. Mysterious in its origin, in its duration, and in its dissolution. Most of us live very busy lives, full of cares and pleasures, a strange compound of hopes and fears, of joys and sorrows, of trials and temptations, of good and evil deeds. If we do not make the good we do overbalance the evil our lives will not have been worth the living. The length of our days depends in a great degree upon the manner in which we spend our time, and the care we take of ourselves. To this extent it may be said, a man's life is in his own hands for the time being, but death is the inevitable certainty for all.

There are times and seasons that come to most of us during our lives, when we are almost overcome with the cares and the labor of this world, doing the things which we think necessary to be done for the support of ourselves and our families, that we are almost ready to fold our arms and lie down for the final rest. And then again there are times when, after the completion of some particularly heavy task, we take a day or two of rest and recreation in visiting friends in distant localities, a feeling of thankfulness and of gladness arises involuntarily in our hearts, that we have been privileged to live in such a beautiful world.

During the thirteen years it has been my privilege and pleasure to be acquainted with David Wilson, I have formed this conclusion, that his life has been a pure and noble one. That he was actuated by a desire for the happiness and the prosperity of others, and his life spent in the performance of duty. We shall miss him, and it will be hard to find a man to fill his place. I hope we can fill out our measure of usefulness, as well as he did his, before we pass from our labors to rest.

H. W. KRATZ, member from Allegheny. I regret that the deliberations and pleasures of this occasion are beclouded with grief and sorrow by the death of our esteemed friend and fellow-member, Prof. David Wilson. When the sad intelligence reached me a few days ago, I could scarcely realize the sorrowful fact that another worthy and useful member of this Board had been summoned to that bourne from whence no traveller returns.

And notwithstanding that my personal acquaintance with our departed friend has been brief, and my knowledge of his life and achievements very limited, I cannot let this opportunity pass without adding an humble tribute to his memory. My first interview with the deceased took place when I became a member of this Board. The greeting of welcome from him was of such character and significance that carried with it impressions which I have not forgotten, but which I shall always remember and cherish. The greeting was sincere and warm-hearted; extended with that regard and fellow-feeling which could only emanate from a man possessed of generous impulses and genuine culture. It was no cold, selfish and mere formal welcome, but a cordial, genial and home-like greeting. His address and speech were graceful, seasoned with the salt of truth, honor and manliness. It was that kind of recognition which was encouraging, bracing and pleasing to one just entering a body where he was a stranger, and of whose business he had but little knowledge.

I soon discovered that my impressions formed of Prof. Wilson were correct. Whilst his views upon subjects discussed by this Board were conservative, at the same time they were liberal, comprehensive and convincing, his thoughts displayed research and intelligence. In short true manly dignity, courtesy and integrity seemed to be the characteristics of his life.

As an agriculturist I assume he was progressive and successful. His knowledge of the sciences qualified him in an especial manner to make practical experiments and effective tests in agricultural pursuits, and enabled him to make many useful and good suggestions upon the numerous subjects which from time to time engaged the attention of this Board. The ethical and social bearing in his general deportment indicated a devoted christian life. Let us impress upon the tablets of our memories such inscriptions of praise and respect for our departed friend as will not be effaced by the busy cares of a day or the pleasures of a season.

Let us revere his name, cherish his memory and imitate his example.

As he was rich in knowledge, ripe in experience, moral and upright in character, we have reason to believe that this spirit dwells in a sphere of greater possibilities, enjoying purer delights than he was privileged to possess during his pilgrimage on earth. As he was wise in time, it is hoped that he is happy in eternity.

F. M. McKEEHAN, member from Perry. I would do injustice to my whole emotional nature at this time, were I to allow this occasion to pass by without adding my humble tribute to a cultured gentleman and eminent scholar, whom I learned to admire more than quarter of a century ago. I regard it as one of the high privileges of my life to have known the Rev. E. E. Higbee, D. D., late Superintendent of Public Instruction; and to have been recognized by him as a personal friend. It gives me a mournful pleasure in the presentation of this *in memoriam*.

Dr. Higbee was born on the 27th day of March, 1830, and graduated from the University of Vermont at the age of nineteen years. He was

the *honor man* of his class. He received his professional education at Mercersburg, in this state, then under the management of two distinguished theologians, Drs. John W. Nevin and Philip Schaff. He entered the ministry of the Reformed Church in 1856, and immediately thereafter became professor of languages in Hiedelburg College, Tiffin, Ohio.

In 1862 he became pastor of Grace Reformed Church, Pittsburgh, Pa. But having made his mark as an instructor, he was not permitted to remain long as a pastor. He was called to be a professor in the theological seminary from which he had graduated with so much honor. In 1869 he was called to the presidency of Mercersburg College, which position he filled with eminence until 1881, when he was appointed by Governor Hoyt, Superintendent of Public Instruction, and re-appointed from time to time until his death on the 13th day of December, 1889.

Dr. Higbee was not too proud to perform the duties of the humblest citizen. He was not unconscious that some men did not understand him. I have had the pleasure to meet him not only in our own state, but in Virginia, Maryland and Ohio, and always have I noted that intensity of mind which characterized him. Dr. Higbee was a profound thinker.

If time permitted, Mr. President, I should repeat what your Excellency said in your proclamation announcing his death, and to the expressed opinion of Ex-Governor Hoyt and what Hon. Charles Emory Smith has written. Thus I might go on adding testimony to testimony of his excellent worth, but this is not the time, neither is it the place.

Dr. Higbee combined two forces seldom combined in one person. He was a metaphysician and an orator. His faculty of long-continued abstraction was amazing, and the subtlety of his analysis was often painful to those about him, and yet underlying all this was the fire of polished oratory. He usually carried his audience with him. In the presence of an assembly his mind would kindle, and his manner would become eloquent. Dr. Higbee was a poet, a linguist, a theologian—indeed he was all these, and much more. He was no ordinary man. In breadth and depth and strength of mind in all its activities—in scholastic attainments—integrity of character—he had few equals and no superiors. He was such a man as you seldom meet in “the walks of life.”

In social life Dr. Higbee was always a central figure. Those who knew him best cannot but call up the depth of his warm and loving heart, as it found expression in his daily life. He had a supreme mastery of his feelings, but every now and then they broke through the restraints, pouring forth floods of emotion that betrayed the deepness of the fountain.

How he loved his family, the institutions of his church and adopted state—the teachers of this commonwealth—and his personal friends, is a theme too sacred to touch. Personally, I am bereft, and with hundreds I deeply and sorely mourn his death. I think of him as a man prematurely old, I think of the classic beauty of his fragile person. I think of the majesty of his burning eloquence, when, in the center of his manhood, great assemblies hung on his lips in rapt attention eager to catch every word which he uttered. “He being dead yet speaketh.” Dr. Higbee was a lover of nature. When he chose to paint its beauties in words it was a most exquisite “pastoral poem in prose,” and a

Theocritus himself might have envied him the "eloquence of his diction and the charm of his imagination."

Doubtless you have observed, Mr. President, that it is characteristic of all great men and exalted minds to be intensely active and busy. This was not wanting in my friend and brother. His was an active and busy life. It was crowded full of toil. He was always in a hurry; his ambition was to dispatch his work of whatsoever kind.

Such men do not live long, but they make up in intensity what they lack in years. The standard of a human life is not measured by years. "Better a fifty years of Europe than a cycle of Cathay." "We live in deeds not in years; in thoughts, not breaths; in feelings, not in figures on a dial. We should count by heart-throbs. He most lives who thinks most, feels the noblest and acts the best." Our friend lived and died in a blaze of constant and intense activity.

For Dr. Higbee "Arbor Day" had a peculiar meaning. On that day he rejoiced because trees and shrubbery were being planted throughout the state. While he was educating the children and the parents to respect life in its lower form, he was in sympathy with the life of flowers, and plants and trees. The life coursing through their veins increased his sympathy for life in its more exalted form. The wanton destruction of a plant or a flower, a tree or a bird, sent a sharp thrill of pain through every fiber of his being. He had great respect for life, regarding it as a gift divine, with a mission of its own to perform. It was the "milk of human kindness" sanctified by the religion of Jesus Christ which made Dr. Higbee so grand and good.

Goodness is above intellectual brilliancy—it is above learning—it is above wit—it is above eloquence—it is above zeal. All these shall pass away, but goodness shall remain, this we think of the longest now, that "he sleeps in the valley so low," and justly so because it is akin to God. It is the one everlasting thing. In presenting this running sketch of my friend's life—in painting this *pen picture* of his public and social life, I would give emphasis to this distinguishing element of his character and would close my scattered eulogium of one I loved by saying "If there be any virtue, and if there be any praise, think of these things."

"To live in hearts we leave behind is not to die."

On motion of Mr. Powell it was resolved that hereafter all obituary notices, resolutions and remarks thereon, be presented at the annual meeting.

S. R. Downing then read an essay on "State Aid for Public Roads" and was followed by Fredk. Jaekel of Blair, with one on "Suggestions to Law-makers of the State of Pennsylvania regarding Public Roads."

The discussion of the general question of roads was opened by Mr. Gundy of Union and participated in by Messrs. Seanor, Barnes, Powell, Riddle, Stitzel, Herr, Downing, McKee, Garretson, Colvin, Phelps, Mather, Eves, Smith, McKee and secretary.

In order to suit the convenience of members who are compelled to leave on early trains, it was decided to combine the two evening lectures and have both Wednesday evening.

On motion adjourned until 8 p. m.

WEDNESDAY EVENING, June 11, 1890.

Board called to order at 8 p. m. by N. F. Underwood, vice president, in the chair, Dr. Leffmann then delivered a lecture upon "The Adul-

teration of Food Products," and followed it by one on "The Application of the Microscope to the Study of Textile Fibers."

On motion, adjourned until 9 a. m. Thursday morning.

THURSDAY MORNING, *June 12, 1890.*

Board called to order at 9 a. m., by Vice President Underwood in the chair.

On behalf of the Executive Committee, Mr. Cooper presented their report, which was adopted.

After a full discussion of the comparative merits of Greencastle and Butler, the Board agreed to hold the autumn meeting at Butler at the call of Advisory Committee.

On motion Mr. Reeder read an essay in answer to the question "What shall we do with our Land," which called out remarks from Messrs. Powell, Smith, Reeder, Garretson, Mitchell, Eves, McCreary and secretary.

W. S. Roland of York then read an essay on "The Past, Present and Future of Agriculture," which was discussed by Governor Beaver and Messrs. Herr, McKeegan, Searle, Gundy, Barnes, Sission, Smith, Garretson, Murray, Kratz, and secretary.

An essay on "The Artificial Hatching of Poultry," written by S. V. Bennet of Wellsboro', was then read by Mr. Mather.

Hon. H. B. Packer then addressed the Board on the subject of "The Fence Laws of Pennsylvania," and Messrs. Searle, Shanafelt, Underwood Packer, McKee, Powell, Kratz, Sission, Eves, Shook, Seanor, Phelps, Reeder, McKeegan and secretary, discussed the general question of fence laws.

On motion adjourned until 1.30 p. m.

THURSDAY AFTERNOON, *June 12, 1890.*

Board called to order at 1.45 p. m. by Vice President Reeder in the chair.

Present—Governor Beaver and Messrs. Downing, Powell, Garretson, Seanor, Deihl, Stitzel, Reeder, Ridde, Jaekel, Shanafelt, Herr, Eves, Phelps, Shook, Colvin, Cooper, McCreary, Barnes, Smith, McKee, Kratz, Murray, Hoffa, McKeegan, Lawrence, Searle, Mather, Gundy, Lott, Underwood, Bunnell, Roland and secretary. Dr. Leffmann and Dr. Groff, of the honorary officers, were also present, with Mrs. Eves, Mrs. Roland, Mrs. Shook and Mrs. Hoffa.

J. E. Rogers, Esq., of Binghampton, New York, then addressed the Board on the subject of "Ensilage as Stock Food," and was followed by Dr. H. P. Armsby on the general subject of "Ensilage."

Hon. J. B. Niles of Wellsboro' then addressed the Board on the subject of "Taxation as it Affects the Farmer" and was followed by Dr. G. G. Groff on "Starting an Apiary."

On motion adjourned to meet at Butler at the call of the Advisory Committee.

MINUTES OF THE AUTUMN MEETING.

Held at Butler, Pa. October 15 and 16, 1890.

Board called to order at 9.15 a. m. by Vice President John McDowell in the chair.

Present during the meeting,—S. R. Downing, Will B. Powell, and Messrs. Garretson of Adams, Seanor of Armstrong, McKibben of Beaver Diehl of Bedford, Stitzel of Berks, Reeder of Bucks, Riddle of Butler, Shanafelt of Clarion, Herr of Clinton, Eves of Columbia, Phelps of Crawford, Thornton of Erie, Shook of Franklin, McCracken of Jefferson, Colvin of Lackawanna, Cooper of Lancaster, McCreary of Lawrence, Barnes of Lehigh, Smith of Luzerne, McKee of Mercer, Murray of Montour, Shimer of Northampton, Hoffa of Northumberland, McKeelhan of Perry, Lawrence of Sullivan, Mather of Tioga, Gundy of Union, Frazier of Venango, McDowell of Washington, Roland of York, Secretary, and Dr. Warren.

On motion of Mr. McCracken, the address of welcome was deferred until two o'clock p. m.

The chair named Messrs. Mather, Herr and Lawrence a committee to receive and report upon the credentials of members and delegates.

On motion of Mr. Phelps, the minutes of the Wellsboro' meeting were read an approved.

The secretary read his report of the annual meeting of The American Forestry Association, at Quebec, which was approved and ordered printed in the proceedings of the Board.

The secretary offered the following resolution, which, after debate, was referred to the Executive Committee:

Resolved, That the Advisory Committee be requested to devote one or more sessions of the annual meeting to the consideration of local or farmers' institutes.

On motion of Mr. Herr, seconded by Mr. McCracken, the question of farmers' institutes was taken up for discussion, and remarks were made by Messrs. Herr, McCracken, Eves, Roland, McDowell, Murray, Riddle, Mather, Thornton, Garretson, McKee and Phelps.

Calvin Cooper, member from Lancaster, read an essay on farmers' institutes, and the discussion was continued by Messrs. Berry, Cooper, Reeder, McDowell, Barnes, McCreary, Roland, Stitzel, Frazier and secretary.

Adjourned to meet at 2 p. m.

WEDNESDAY AFTERNOON, *October 16, 1890.*

Board called to order at 2 p. m. by Vice President McDowell in the chair.

Hon. John M. Sullivan, on behalf of the citizens of Butler and Butler county, welcomed the Board as follows:

Mr. Chairman and Gentlemen of the Pennsylvania State Board of Agriculture:

I am commissioned to tender you a cordial welcome from the people of Butler on this occasion of your meeting in this place. This welcome we desire you to accept, not merely as a customary formality but as a hearty greeting.

Our thanks are due to your Board for selecting Butler as the place for the meeting.

Knowing, as we do, that pressing invitations from other interesting points in the state were postponed to give us the benefit of your presence and influence. We hope that the selection of this as your place of meeting will not in any way detract from the interest and profit you expected to realize in again assembling together. Whilst we feel confident that your meeting here will awake renewed life and interest in this community in the great work in which you are engaged.

You meet in what, a few years ago, was regarded as one of the most hopeful agricultural districts of western Pennsylvania. Perhaps the progress which should have been made, and which was seasonably expected, has been so much checked by the extraordinary development recently of mineral and oleaginous wealth. Still there has been a marked advancement all along the line of your work, amongst our people a result to which you can justly claim to have contributed. Nature has been lavish in spreading over our territory a rich productive soil, inviting the tiller to seek fresh rewards. In this day these rewards are not wholly or even largely from manual labor, but from an intelligent application of the multiplied help at hand to secure them. Underlying our soil wealth has been stored which eager seekers are now developing. This development is, in many cases, to the detriment of an improvement and embellishment of the surface. Whether this will be an enduring advantage is a problem yet to be solved. Whether the farm with all its improvements and appliances, such as your Board would indicate, is profitably exchanged for waste and fenceless fields, with the unsightly derrick as the symbol of expected wealth displacing the farm house, would readily receive an affirmative answer from many in this commonwealth, but it is an enquiry which the thoughtful stranger visitor would naturally suggest. However this may be, it is well that we should not forget, in looking for underlying wealth, the claims that the soil present as a source of permanent prosperity, and we are grateful to you, gentlemen, for your coming to remind us of, perhaps, neglected duty in this regard.

With our thanks, gentlemen, accept our congratulations upon the success already accomplished by your association, and by kindred associations in Pennsylvania. Not only state but national character and prestige have been given to agriculture, mainly through such instrumentalities. Our nation, rather tardily, but at last, has placed agriculture where it long since should have been, in line with her other great government cares, by the establishment of the Department of Agriculture. Foreign nations had put ours to the blush by their precedence in this matter. But now we will accept no secondary place with regard to the working machinery of the government by which the length of thought and labor in the interest of agriculture can have a world wide extension under governmental authority, whilst home channels will be greatly aided and enlarged in having a permanent national fountain.

We would not forget that yours is a *Pennsylvania* association, and that your work is primarily and mainly in behalf of the great agricultural interests of the commonwealth. Pennsylvania from her infancy has been known as an agricultural state. Whilst yet a pioneer she had her garden spots, pointed to with pride by the settlers. These were multiplied through succeeding years until in almost every part of her extended territory they could be found. But for very many years, with these notable exceptions, the business of farming was toil for subsistence in the simplest and hardest way. This had become so fixed and general that the first agricultural educators encountered every obstacle that prejudice could interpose or ridicule invent. The pioneers, of whom you are the successors, passed through a stormy period of opposition with an undaunted courage and indomitable perseverance buoyed up with the hope of the good time coming, which you are beginning to realize. Now, "the slipshod tumble-down" farm is the exception in Pennsylvania, not the rule, and the shafts of ridicule, once aimed at "the book farmer," are now turned upon the farmer without books. We are proud, as Pennsylvanians, of our farms. The model farm of Pennsylvania is a realization of our ideal of what a farm should be. We, it is true, do not take in the broad sweep of a western prairie with hundred acre fields yielding a single kind of grain as a crop, and this crop claimed even before it is gathered by commerce as her great staple, and by speculation as the prey of its wildest arts. "Ranche" is not a Pennsylvania designation for the abode of our choice stock. The Pennsylvania farmer does not aspire, on our own soil, to do any such farming. It is this small farm with its little, well-tilled fields, luxuriant with the various grasses of the best varieties, the selected stock in which quality rather than quantity has been considered, the substantial, yet tasteful, barns, granaries and sheds, the carefully cared for fencing and drainage, the paths, lanes and roads in perfect condition, the orchards and vineyards borne down with the choicest fruits, the garden Eden-like in beauty and fragrance. And, above all, and the center of all, the *home* in the midst, neat, comfortable and attractive; the abode of the noblest manhood, the purest and loveliest womanhood, and the most innocent and happy childhood. It is to such a farm the Pennsylvanian points with pride. Such farms are already dotted over this commonwealth. May the time soon come when their number and beauty shall be the crowning glory of the state. Such farms are the product of educated enlightened agriculture.

The first page of the history of agriculture, is found amongst the first pages of Holy Writ. That page designates it as a divinely blessed and sanctified institution,

represented in the person of the first martyr and through all the ages since, history, sacred and profane, has given it the foremost rank. The heathen world, in the palmiest days of its glory and learning, deified it. Science, art and poetry have always eagerly sought to be its handmaidens.

But, it has been reserved for the nineteenth century, for the times in which the lives and for the country in which our lots are cast, to witness its greatest progress and development. Standing as the vanguard of our civilization with her twin sisters, commerce and manufactures, close by her side, agriculture will accept no secondary place, but, from her well-earned vantage ground, claim tribute from the learning, ability and genius of the world, appropriating as legitimately her own, the products of skill, invention and taste. With beneficent hand extended agriculture brings relief to the weary toiler with all the appliances she has gathered and commands, promising the greatest rewards to those who will intelligently and thoughtfully study her present requirements.

You, gentlemen, are engaged in the grand work of helping the Pennsylvania farmer to meet those requirements. This is one of the purposes of your meeting here to-day. Such meetings must be greatly helpful. Your associated effort, your comparison of views and opinions, your open discussion of agricultural topics, your familiar attacks upon themes in which you are all interested, and in which you desire to interest us. Must, as you go from one section of the state to another, leave a most salutary impression.

With our "all hail," I am authorized to salute you. We hope your meeting in Butler may prove agreeable, profitable and refreshing to the members of your Board who honor us with their presence. We regret that as many of you probably now make your first visit to our place, that you cannot carry away more favorable impressions of its appearance. "Road pointers," has a place on your programme. We must crave the mercy of the writer, not too strongly to emphasize his topic after observing the present condition of our streets and adjacent roads. We are earnestly, and with all our enterprise endeavoring to improve. We hope you will soon come again and then we will have the pleasure to introduce you to a handsome young city with well-paved streets. And then we will dare to speak of our marvellous growth, our attractive business sites, our large manufactures, our superior railroad facilities, our handsome residences, and surrounding model farms. Now, we are aware it becomes us to be exceedingly modest in our pretensions, until we are in a more presentable condition.

Your meeting in Butler, we believe, will be an inspiration to our people, enlisting anew their sympathies and efforts, in active coöperation with you in your work, and will be permanently beneficial to the great agricultural interests of our county. For this we thank you, and again repeat our *welcome*.

D. B. Douthet of Brownsdale, Pa., read an essay on "Economy on the Farm," the subject matter of which was discussed by Messrs. Murray, Gundy, Nixon, Weir, Douthet, Herr, McCracken and Secretary.

Hon. A. D. Weir of Butler, Pa. read an essay on "Waste and Repair," which was discussed by Messrs. Reeder, Weir, Phelps, McDowell, Eves and Shanafelt.

Eastburn Reeder, member from Bucks, read an essay on "The Organization of Farmers," and W. C. Berry of Houstonville, Pa., one in answer to the question "Should Farmers Organize?" The subject matter of the two essays was discussed by Messrs. Dr. Edge, Colvin, Garretson, Seanor, Nixon, McCracken, Eves, McCreary, Barnes, McDowell.

The secretary announced that owing to the illness of Dr. Leffmann, the evening lecture would be delivered by Hon. Will B. Powell, who would speak in relation to "The Effect of Climate, Soil and Development upon Animal Life."

On motion, Dr. J. P. Edge of Dowingtown was granted ten minutes at the opening of the evening session for the purpose of explaining the work of the Women's Silk Culture Association of the United States, and Dr. B. H. Warren was accorded the same privilege to explain the forthcoming report on the "Birds of Pennsylvania."

WEDNESDAY EVENING, *October 16, 1890.*

Board called to order at 8 p. m. by Vice President McDowell in the chair.

In accordance with the arrangements made at the end of the afternoon session, Dr. John P. Edge explained the work of the Women's Silk Culture Association of the United States, and Dr. B. H. Warren explained the second edition of the "Birds of Pennsylvania."

Hon Will. B. Powell, of Shadeland, Pa., then addressed the Board on the subject of "The Effect of Climate, Soil and Development on Animals."

On motion, adjourned until 9 a. m., Thursday, October 17.

THURSDAY MORNING, *October 17, 1890.*

Board called to order at 10 a. m. by Vice President McDowell in the chair.

M. N. Greer of Sarver, Pa., not being prepared with his essay on "The Improvements of Farms," was omitted.

M. W. Oliver of Conneautville, Pa., then read an essay entitled "A Plea for Better Live Stock," which was discussed by Messrs. Powell, Garretson, Thompson, Oliver, Barnes, Eves, Lawrence, Thornton and Secretary.

Hon. Josiah M. Thompson of Sonora, Pa., read an essay on "The American Farmer."

J. A. Gundy, member from Union, read an essay on "Watchman Tell us of the Night," which elicited discussion from Messrs. Roland, Cooper, Riddle, Smith, Thompson, Dr. Edge, Powell, Herr, McDowell McCracken and Secretary.

THURSDAY AFTERNOON, *October 17, 1890.*

Board called to order at 1 p. m. by Vice President Reeder in the chair.

The chair named Messrs. Roland, Cooper and McCracken a committee on resolutions.

S. R. Downing read an essay on "Labor vs. Cash Tax for Roads," and the secretary read one on "Road Pointers," when the road question was declared open for general discussion, which was participated in by Messrs. Barnes, McCracken, Dr. Edge, Smith, Seanor, Greer, Garretson and Secretary.

Simeon Nixon of Butler, Pa., then read an essay on "Farmers' Wives," which called out remarks from Messrs. Powell, Gundy, Shook, McCracken, Herr, Nixon and Smith.

Dr. J. P. Edge of Downingtown, Pa., read an essay on "Water Storage against Drought," which was discussed by Messrs. Powell, Thornton, Murray, Dr. Edge, McCreary and secretary.

The question "Is it better for the land that manure should be plowed fresh from the yard or remain spread on the ground until dry," was discussed by Messrs. Murray, Greer, Garretson, Phelps and others.

Mr. Cooper offered the following: WHEREAS, It seems necessary, from the statements made at the present meeting of the Board, that some better organization of farmers should be devised, and it being advisable that it should be national; therefore, *Resolved*, That the president of this Board appoint a committee of five, of which Eastburn Reeder shall be chairman, to consult with the Secretary of Agriculture at Washington, and if possible devise some plan and comprehensive form as the foundation of a national organization for the promotion of the interests of those engaged in agricultural and horticultural pursuits, and report at the next annual meeting of this Board.

After having been discussed, adopted and the vote reconsidered, the

resolution was adopted by a majority of one and the chair named Messrs. Reeder, Roland, Riddle, Seanor and Phelps, as members of the committee.

Dr. Roland, on behalf of the committee on resolutions, presented the following which was unanimously adopted:

Resolved, That the thanks of the Board are most respectfully tendered to W. H. H. Biddle, Esq., the resident member of the Board, for his untiring efforts in providing for our personal comfort, and also to the county commissioners for the use of the court house as a place of meeting.

Resolved, That we return our thanks for the kind words of welcome as expressed by Hon. John M. Sullivan, and to the citizens of Butler and vicinity for their attendance and interest taken in the business of the meeting.

Resolved, That we will long remember our visit to the works of the Standard Plate Glass Company, and that we hereby thank D. E. Wheeler, Esq., their business manager, and others, for their care and attention.

On motion, adjourned to meet at Harrisburg the fourth Wednesday in January next.

EXTRACTS FROM THE ANNUAL REPORT OF THE SECRETARY.

Meetings and Local Farmers' Institutes.

During the past year the Board has held three general meetings and forty three local farmers institutes; the general meetings were held as follows: Harrisburg, January 22 and 23; Wellsboro, June 11 and 12; and Butler October 15 and 16; the local institutes were held at times and places as shown by the accompanying tabular statement.

The general meetings of the Board were well attended by the members, and those held at Wellsboro and Butler were probably the largest meetings of members ever held.

The increased size of the Board, which necessarily very much increases the size and cost of our general meetings, would indicate that it would be well to carefully consider some plan by which the cost per meeting may be decreased, and in this connection it may be well to take into consideration the plan of dividing the state into four districts, and holding one meeting, in addition to the annual one at Harrisburg, in each district each year; the advantage which may be claimed for this plan are that the five meetings thus provided for would probably not cost more than the three now held, and would enable us to reach more farmers during the year. A meeting of the Board held west of the mountains is very expensive because a majority of our members reside in the eastern and middle portion of the state. If, as was proposed, the district meetings are to be attended only by members residing in the district the saving in mileage would be considerable.

This plan was proposed several years ago, when the membership was considerably smaller, but it did not meet with approval to an extent which would warrant its adoption. Now that the membership has been

increased to fifty-five, economy in its general expenditures, with its limited appropriation for the expenses of its members, becomes not only a duty but absolutely a necessity.

Another plan, which is also worthy of consideration, is to decrease the number of general meetings and detail members to attend local farmers' institutes during the winter; this plan would, without increasing the draft upon the institute fund, greatly increase the interest in these meetings, and would enable our members to become familiar with the institute work and also enable them to reach a much greater number of farmers than by the plan at present adopted.

These and other plans should be carefully considered, and some well defined one plan adopted, which, while it will decrease the average expenses of our meetings, will enable us to reach a greater number of farmers; there may be and undoubtedly are other plans which would reach the same end, and that possibly in a better and more economical manner, but these two are proposed for consideration, and we know that the Board may be trusted to adopt the one which will give the best results for the expenditure of the funds placed under their charge.

What has been styled the "Pennsylvania plan" of holding local and farmers' institutes, has, after another year's test, shown itself to be adequate for the purpose for which it was intended, and the fact that the institutes of the past year were held at an average cost of less than eighty dollars is sufficient proof, with those who are acquainted with the work accomplished, of the economy and practicability of the system. It is quite possible that this plan may be modified and improved in some particulars, but I would not advise any radical change in the present plan of conducting these meetings. If instead of holding three general meetings of the Board, a proper number of members were detailed to attend each of the local institutes, it would greatly add to the interest of the latter and at the same time decrease the expenditure of the fund for the expenses of our members.

Under the system adopted, each institute is managed and conducted by the local member, or, in the absence of local member, by some one selected by the Board; this manager selects all of the speakers and essayists, and, from the fund placed at his disposal by the Board, pays all of the expenses of the meeting; at the close of the institute he furnishes the secretary with a detailed account of all expenses, which must in no case exceed the amount set apart by the committee for the expenses of the institute. During the past year the Advisory Committee appropriated one hundred dollars in each case where one institute was held in a county and one hundred and fifty dollars where more than one was held; the resident member or appointed manager was held strictly accountable for the expenditure of this amount and accounted to the secretary for every item of expenditure.

As one of the main points of this plan it may be claimed that the resident member can best judge of the special needs of his own district, and, as he selects topics, essayists, and speakers, he is able to so adjust his programmes as to give satisfaction to the greatest possible number of the citizens of the locality covered by the institute.

In cases in which institutes have been asked for in counties in which there is no resident member, or in which the resident member makes no request for an institute, the Board has assigned the management to persons properly recommended and in some case such institutes have been placed under the care of the nearest members of the Board.

During the present and coming institute season, the committee has

endeavored to inaugurate a system by which they believe, with the co-operation of members of the Board and institute managers, will result in economy and reduced expenses; the various counties in which institutes were held last year have been arranged in districts or circuits, and it is proposed that the institutes in each district shall be all held during the same week, so that speakers and essayists from a distance can pass from one institute to another at the minimum of expenses in funds and time; by following this plan it has been estimated that at least one-tenth of the institute fund may be saved and thus enable the committee in charge to accomplish one-tenth more work.

The institutes are arranged by the committee contain (November 1) only the counties which held institutes last season; new ones applying this season will be added to districts already existing or will be assigned to new districts as may be found best; the districts are as follows:

1. Wayne and Lackawanna.
2. Susquehanna and Wyoming.
3. Bradford and Tioga.
4. Erie, Warren and Crawford.
5. Venango, Mercer and Lawrence.
6. Butler, Clarion, and Armstrong.
7. Somerset, Westmoreland, and Bedford.
8. Clinton, Centre and Huntingdon.
9. Perry, Juniata and Franklin.
10. Adams and York.
11. Lancaster and Chester.
12. Montgomery and Bucks.
13. Berks, Lehigh and Northampton.
14. Northumberland, Montour and Union.
15. Columbia and Luzerne.
16. Cumberland and Lebanon.

During the present year the following new counties have applied for and have been assigned institutes: Blair, Butler, Clearfield, Fayette, Greene, Jefferson, Lebanon, Mercer, and Warren.

During the institute year which commenced June 1 last, eighty-two (82) institutes were applied for; after a careful examination of the list, the committee reduced the number to sixty, which were granted as follows:

COUNTY.	Number of institutes.	Name and address of manager.
Adams,	2 institutes,	I. Garretson, Biglerville.
Armstrong,	2 "	Noah Seanor, Plumville.
Bedford,	2 "	S. S. Diehl, Bedford.
Berks,	1 "	G. D. Stitzel, Reading.
Blair,	2 "	F. Jaekel, Hollidaysburg.
Bradford,	1 "	Ch. D. Derrah, Canton.
Bucks,	2 "	E. Reeder, New Hope.
Butler,	1 "	W. H. H. Riddle, Butler.
Centre,	2 "	J. A. Woodward, Howard.
Chester,	2 "	D. H. Branson, Atglen.
Clarion,	1 "	W. Shanafelt, Brinkerton.
Clearfield,	1 "	E. M. Davis, Grampian Hills.
Clinton,	2 "	J. A. Herr, Cedar Springs.
Columbia,	2 "	Chandlee Eves, Millville.
Crawford,	2 "	J. B. Phelps, Conneautville.
Erie,	2 "	J. C. Thornton, Avonia.
Fayette,	1 "	Richard Boyd, Pennsville.
Franklin,	1 "	D. Z. Shook, Greencastle.
Greene,	1 "	W. M. Parry, Higbee.
Huntingdon,	2 "	G. W. Musser, Graysville.
Jefferson,	1 "	J. McCracken, Jr., Frostburg.
Juniata,	1 "	D. B. Esh, Spruce Hill.
Lackawanna,	1 "	H. M. Colvin, Dalton.
Lancaster,	2 "	C. Cooper, Bird-in-Hand.
Luzerne,	2 "	J. A. B. Koona, Huntingdon Mills.
Mercer,	1 "	Robert McKee, Mercer.
Montgomery,	1 "	W. H. Yerkes, Jr., Hatboro'.
Montour,	1 "	J. K. Murray, Potts Grove.
Northampton,	1 "	A. D. Shimer, Bethlehem.
Northumberland,	1 "	John Hoffa, Milton.
Perry,	1 "	F. M. McKeehan, Ferguson.
Somerset,	1 "	N. B. Critchfield, Jenner's Cross Roads.
Susquehanna,	2 "	R. S. Searle, Montrose.
Tioga,	1 "	J. W. Mather, Wellsboro'.
Union,	1 "	J. A. Gundy, Lewisburg.
Venango,	1 "	A. Frazier, Cooperstown.
Warren,	1 "	Chas. Lott, North Warren.
Washington,	1 "	J. McDowell, Washington.
Wayne,	1 "	N. F. Underwood, Lake Como.
Westmoreland,	1 "	E. E. Critchfield, Mt. Pleasant Mills.
Wyoming,	1 "	N. G. Bunnell, Vosburg.
York,	2 "	Dr. W. S. Roland, York.

Under previous regulations it had been the custom of the advisory committee to appropriate one hundred dollars to counties holding but one institute, and one hundred and fifty to counties holding two or more; this year, after reducing the list to what they thought to be the minimum, the committee found that they were compelled to also reduce the allowance to each institute; they considered it best to reduce the allowances of all rather than to refuse some entirely. During the present season the amount appropriated to a single institute is eighty dollars and where two or more are held, one hundred and twenty dollars.

The annually increasing demand for this class of meetings may be accepted as an index of their appreciation by the farmers of our state, and we do not think that the state appropriates a similar amount of money anywhere which so directly reaches the class whom it is intended to benefit and which accomplishes so much in proportion to the amount expended as this. But for the positive limitation of the committee to one hundred and twenty dollars to any one county, the lists of applications would have been much greater and would have absorbed double the amount appropriated by the Legislature for this purpose.

In conclusion, we would strongly recommend the adoption of some plan which will secure a larger attendance of members of the Board at these institutes; under the present plan and with the limited amount appropriated the managers of institutes do not feel warranted in inviting members of the Board whose expenses must be deducted from the amount of the appropriation for the institute; by the adoption of some plan similar to the one proposed for general Board meetings, a more general attendance of members of the Board could be secured and greater benefit result not only from their presence among our farmers, but also from the benefit which they themselves would obtain from the opportunity to study the different plans adopted by local managers.

List of Local Farmers' Institutes,

Held under the auspices of the State Board of Agriculture, and in accordance with the act of May 23, 1889, during the season of 1889-90.

COUNTY.	Where held.	Date.	Managed by
Adams,	Gettysburg,	Jan. 9-10, ..	I. Garretson, Biglerville, Pa.
Adams,	Bendersville,	Feb. 20-21, ..	I. Garretson, Biglerville, Pa.
Armstrong,	Kittanning,	Feb. 6-7, ..	W. R. Ramaley, Cochran's Mills, Pa.
Bedford,	Bedford,	Jan. 24-25, ..	S. S. Deihl, Bedford, Pa.
Bedford,	Hyndman,	March 19-20, ..	S. S. Deihl, Bedford, Pa.
Berks,	Hamburg,	March 5-6, ..	G. D. Stitzel, Reading, Pa.
Berks,	Reading,	Feb. 1, ..	G. D. Stitzel, Reading, Pa.
Berks,	Reading,	March 1, ..	G. D. Stitzel, Reading, Pa.
Berks,	Reading,	April 5, ..	G. D. Stitzel, Reading, Pa.
Bucks,	Langhorne,	Dec. 10-11, ..	E. Reeder, New Hope, Pa.
Bucks,	Riegelsville,	Feb. 27-28, ..	E. Reeder, New Hope, Pa.
Bradford,	Canton,	March 13-14, ..	C. D. Derrah, Canton, Pa.
Chester,	Unionville,	Jan. 6-7, ..	C. F. Wickersham, Unionville, Pa.
Chester,	Atglen,	Feb. 6-7, ..	D. H. Branson, Atglen, Pa.
Chester,	Oxford,	Feb. 13-14, ..	T. K. Stubbs, Oxford, Pa.
Centre,	Howard,	Jan. 7-8, ..	J. A. Woodward, Howard, Pa.
Centre,	State College,	Jan. 9-10, ..	H. P. Armsby, State College, Pa.
Clinton,	Mill Hill,	Jan. 15-17, ..	J. A. Herr, Cedar Springs, Pa.
Clinton,	Loganton,	March 20-21, ..	J. A. Herr, Cedar Springs, Pa.
Columbia,	Benton,	Jan. 8-10, ..	C. Eves, Millville, Pa.
Columbia,	Millville,	Jan. 29-31, ..	C. Eves, Millville, Pa.
Columbia,	Berwick,	Feb. 25-26, ..	J. W. Evans, Berwick, Pa.
Crawford,	Linesville,	Dec. 11-12, ..	J. B. Phelps, Conneautville, Pa.
Crawford,	Cambria,	Feb. 20-21, ..	J. B. Phelps, Conneautville, Pa.
Erie,	Erie,	Feb. 26-27, ..	J. C. Thornton, Avonia, Pa.
Erie,	Corry,	March 18-19, ..	J. C. Thornton, Avonia, Pa.
Franklin,	Greencastle,	Dec. 5-6, ..	G. H. Cook, Greencastle, Pa.
Huntingdon,	Warrior's Mark,	Jan. 28-29, ..	G. W. Musser, Graysville, Pa.
Juniata,	Centre,	Dec. 20-21, ..	D. B. Esh, Spruce Hill, Pa.
Lancaster,	Black Barren Springs,	Sept. 5-6, ..	C. Cooper, Bird-in-Hand, Pa.
Lancaster,	Lancaster,	Jan. 8-9, ..	C. Cooper, Bird-in-Hand, Pa.
Lawrence,	New Castle,	Feb. 13-14, ..	S. McCreary, Neshannock Falls, Pa.
Lehigh,	Slatington,	Feb. 14-15, ..	W. M. Benninger, Walnutport, Pa.
Luzerne,	Huntingdon Mills,	Jan. 7-8, ..	Z. S. Stevens, Huntingdon Mills, Pa.
Montgomery,	Hatboro',	Jan. 8-9, ..	W. H. Yerkes, Jr., Hatboro', Pa.
Montour,	Danville,	Jan. 28-29, ..	J. K. Murray, Potts Grove, Pa.
Northampton,	Bath,	Jan. 30-31, ..	W. M. Benninger, Walnutport, Pa.
Northumberland,	Milton,	Feb. 26-27, ..	John Hoffa, Milton, Pa.
Perry,	New Bloomfield,	Jan. 7-9, ..	F. M. McKeehan, Ferguson, Pa.
Somerset,	Somerset,	Feb. 11-12, ..	N. B. Critchfield, Somerset, Pa.
Somerset,	Jenner's X Roads,	March 29, ..	N. B. Critchfield, Somerset, Pa.
Susquehanna,	Montrose,	Dec. 19-20, ..	R. S. Searle, Montrose, Pa.
Susquehanna,	New Milford,	Feb. 26-27, ..	R. S. Searle, Montrose, Pa.
Susquehanna,	Montrose,	April 29-30, ..	R. S. Searle, Montrose, Pa.
Tioga,	Wellsboro',	March 13-14, ..	J. W. Mather, Wellsboro', Pa.
Union,	Lewisburg,	Jan. 14-15, ..	J. A. Gundy, Lewisburg, Pa.
Venango,	Franklin,	Feb. 14-15, ..	A. Frazier, Cooperstown, Pa.
Wayne,	Honesdale,	Jan. 15-16, ..	N. F. Underwood, Lake Como, Pa.
Westmoreland,	Mt. Pleasant,	Feb. 13-14, ..	N. B. Critchfield, Somerset, Pa.
Wyoming,	Tunkhannock,	Feb. 5-6, ..	N. G. Bunnell, Vosburg, Pa.
York,	Stewartstown,	Dec. 26-27, ..	Dr. W. S. Roland, York, Pa.
York,	York,	Feb. 20-21, ..	Dr. W. S. Roland, York, Pa.

History of the Board.

January 24, 1876, Dr. John P. Edge, member from Chester county read in place in the House of Representatives, a bill "to establish a State Board of Agriculture;" the law was founded upon the same principles which had so successfully been put into practice by the Massachusetts State Board of Agriculture, and but few changes were necessary to fit them to our constitution. This bill passed the House of Representatives, April 24, 1876, by a vote of one hundred and nineteen to twenty-two. It was reported in the Senate April 28, and received the sanction of that body by a vote of thirty-one to one; it was signed by Governor J. F. Hartranft, May 8, 1876, and became a law.

During its passage through the House of Representatives a few slight changes were made in it to remove some constitutional objections, and since the date of its passage has been unchanged.

This act prescribed the duties of the Board as follows:

"They shall investigate such subjects, relating to improvement in agriculture in the state, as they may find proper, and take and hold in trust, and exercise control over donations made to them for the promotion of agriculture and the general interests of husbandry."

"They may prescribe forms for, and regulate returns from, local agricultural societies, and furnish the officers of each such blanks as they deem necessary to secure uniform and reliable statistics."

"They shall annually, on or before the fourth day of January in each year, by their president or secretary, submit to the general assembly a detailed report of their doings, with such recommendations and suggestions as the interests of agriculture may require."

Hon. G. A. Grow, thus still further outlines the duties and work of the Board: "That the State Board of Agriculture is designed not only to contribute to the intellectual culture and education of the farmers of the state, but that it is also designed, in a certain sense, to legislate for this same interest. I do not, of course, mean by this that it is to pass laws and exact statutes; but I do mean that if the State Board of Agriculture, with due deliberation, arrives at definite conclusions in relation to the different agricultural interests of the commonwealth, that these conclusions must and should receive, at the hands of the law-making power, the attention and influence which they so well deserve. Representing the agricultural interests of the commonwealth as you do, you are bound to receive at the hands of the legislature and the Executive that consideration to which the great interest which you represent is entitled; when you wisely legislate within the powers of the Board, and arrive at conclusions and make these conclusions known, you may feel certain that they will receive favorable recognition."

1877.

February 1, 1877, the newly appointed and elected members of the Board met in the State Library in accordance with a call issued by Governor J. F. Hartranft. At this meeting the following were present with proper credentials of membership:

Ex-officio members.—Gen. J. F. Hartranft, Governor; Hon. J. Simpson Africa, Deputy Secretary of Internal Affairs; Dr. J. P. Wickersham, Superintendent of Public Instruction; Dr. James Calder, president Pennsylvania State College.

Members appointed by the Governor.—Dr. John P. Edge of Chester, Col. James Young of Dauphin, Hon. John L. George of Washington.

Members elected by County Agricultural Societies—Berks, W. G. Moore; Blair, Thaddeus Banks; Centre, John Hamilton; Chester, Thos. J. Edge; Indiana, Geo. W. Hood; Mercer, A. Robinson; Lancaster, H. M. Engle; Montgomery, W. A. Yeakle; Northumberland, J. A. McFarland; Schuylkill, J. S. Keller; Union, J. W. Shriner; Crawford, M. C. Beebe; York, W. S. Roland; Luzerne, J. B. Smith.

Of these original members elected by county societies Dr. W. S. Roland, J. B. Smith and Thos. J. Edge are the only ones now members of the Board; of the membership appointed by the Governor, Col. James Young is the only one still retaining a membership, and of the *ex officio* members none are now members.

At this meeting the chair named Messrs. Dr. Edge, Beebe, Africa, Roland, Calder, George and Hamilton a committee to arrange for organization and business; this committee afterwards reported a series of by-laws, which, with but little modification, govern the Board at this time.

After transacting the business before it the Board adjourned to meet May 22, 1877. At this meeting the following newly-elected members (by county agricultural societies) presented credentials:

Lehigh, Dr. J. P. Barnes; Bradford, L. J. Culver; Juniata, Prof. David Wilson; Susquehanna, J. C. Morris; Bucks, Eastburn Reeder; Northampton, C. L. Whitesell; Lycoming, D. H. Foresman. Of these Dr. J. P. Barnes and Eastburn Reeder are still members of the Board; Prof. David Wilson, J. C. Morris and D. H. Foresman died while members. At a subsequent session S. F. Wilson of Tioga and E. G. Fahnestock of Adams were admitted to membership; neither of them are now members, having been succeeded by I. Garretson and J. W. Mather.

After the meeting held May 22, 1877, and before the close of the year, the following counties sent members who were admitted:

Cumberland, C. H. Mullin; Franklin, C. Gilbert; and Warren, J. H. Hiller; of these C. H. Mullin still remains a member of the Board.

In closing up the work of the year we note that of the original members on the roll at the close of 1877, the following are still members of the Board, by virtue of election by county societies: Col. James Young, C. H. Mullin, J. B. Smith, Dr. W. S. Roland, Dr. J. P. Barnes, Eastburn Reeder and Thos. J. Edge.

During this year the first honorary officers of the Board were selected. Of these, Thos. Meehan, botanist, Dr. Henry Leffmann, microscopist, and Prof. J. P. Lesley, geologist, are still honorary officers of the Board and still holding their original positions.

During this year, through the liberality of Dr. F. A. Genth, the chemist of the Board, and two or three gentlemen who saw the benefit which would arise from it, a partial analysis of the fertilizers used in the state was made and published in the report of 1877; this gratuitous work laid the foundation for the act of June 28, 1879, which has been of such signal benefit to the farmers of the state, and which, with the assistance of the State College Experiment Station, is annually saving the consumers of fertilizers not less than \$325,000 each year.

During this year the report of the secretary and the address of the botanist of the Board, called public attention to the important question of forestry, and its effect upon the various interests of the state. The reports of the secretary and veterinary surgeon also called attention to the outbreak of contagious pleuro-pneumonia and laid the foundation for the act of May 1, 1879, under which the Board so successfully

eradicated this source of loss to our live stock owners. The different members of the Board were, during this year, directed to visit the local and county fairs of the different counties of the state, and their reports form an interesting and valuable portion of the work of the Board.

1878.

During this year meetings of the Board were held as follows: Harrisburg, January 23 and 24; Doylestown, May 30 and 31; Titusville, September 10th and 11th.

During the year the following counties were admitted to membership: Beaver, R. Sterling; Somerset, C. C. Musselman; Greene, Morgan Wise.

The annual report of the secretary for this year embraces the following subjects: Cultivation of jute in Pennsylvania, the Guenon system of selecting milk cows, commercial fertilizers, the unimproved lands of the state, fence laws, diseases of live stock, value of the works of the Board, crop statistics, wheat, oats, hay, corn, and potato crops.

The leading topics discussed by the Board were, The breeding of better live stock, the geological survey and its relation to agriculture, fruit growing, sheep breeding, dog laws, cost of butter, plant life and its lessons, veterinary science, Texan fever, raising dairy stock, insects and their depredations, machinery of farms, industrial education the pine lands of the state, and sundry minor topics all of which are fully set forth in the annual report of the year.

A resolution requesting the Governor to appoint a commission to test and report on the Guenon system of selecting milk cows, was adopted and a commission consisting of George Blight, Chalkley Harvey and Willis P. Hazard was appointed by Governor Hartranft; their report is to be found in full in the report of the year, a large number were also issued in pamphlet form.

The supply of annual reports of this year has been completely exhausted and they cannot be obtained.

1879.

During the year 1879 three meetings of the Board were held, as follow, Harrisburg, January 22 and 23; Philadelphia, June 5 and 6; Mercer, October 15 and 16.

During the year the following counties were admitted to membership:

Butler, S. M. Wehl; Clinton, J. A. Herr; Erie, J. Miles; Lawrence D. H. Wallace; Wayne, N. F. Underwood.

The work of the Board in relation to the analyses of the commercial fertilizers of the state, and the eradication of contagious pleuro-pneumonia from the state, this year culminated in the almost unanimous passages of the act of June 28 1879 (to regulate the manufacture and sale of commercial fertilizers), and the act of May 1 1879 (to prevent the spread of contagious pleuro-pneumonia). Both of these laws have been eminently successful, and to-day Pennsylvania has the credit of having the most just and best fertilizer law in the United States, and the work and influence of the Board of Agriculture, assisted by the hearty coöperation of Governors Hoyt, Pattison and Beaver, is one of the two states which accomplished the work of eradicating contagious pleuro-pneumonia.

During this year the first attempt was made to secure reliable sta-

tistics in relation to the yield and condition of the crops of the state; some three hundred statistical reporters were named by members of the legislature and confirmed by the Board. Each year since a number of these, with addition rendered necessary each year, have rendered valuable assistance to the secretary by reporting outbreaks of contagious disease among live stock, and by furnishing information asked for by members of the Board.

1880.

During the year 1880 meetings of the Board were held at the following points and dates:

Harrisburg, January 28 and 29; Gettysburg, June 9 and 10; Reading October 13 and 14.

During the year the following new members were received:

Bedford, J. E. Noble; Bradford, H. L. Scott; Butler, J. D. Lytle; Dauphin, W. H. H. Seig; Delaware, Dr. E. Harvey; Montour, M. D. L. Sechler; Susquehanna, Henry C. Tyler; Warren, F. R. Miller.

During this year the number of agricultural reports was increased from 8,000 to 14,050 per year, and 1,000 copies of the quarterly reports were, by a special law, ordered to be printed and distributed.

The report of the secretary contained a complete and elaborate account of the crops of the year and of the number and condition of the live stock of the state. The report of the chemist contained the analyses from samples selected under oath or affirmation, of a large number of samples of commercial fertilizers selected in different portions of the state, under the provisions of the act of June 28 1879. Thos. Meehan, botanist, made a report on the forests of the state; Josiah Hoopes, pomologist made an extended report in relation to the fruit of the state; Dr. Leffmann, microscopist, reported upon the adulteration of food and food products; W. A. Buckhout, entomologist reported on injurious insects in forest and shade trees; Dr C. B. Michiner, veterinary surgeon of the board made a report on husk or hoose in calves, and on acute laminitis in the horse.

The leading topics considered at the meetings were maintaining the fertility of the farm, adornment of farmers' homes, farm fences and fence laws, apples and their production, agricultural societies and their management: botanical science, elements of plant food, cutting potatoes, duties of farm employer and employé, centrifugal creamers, cost of fences, clover and its value as a fertilizer, agricultural experiments, silk culture by women, typus in horses, and numerous topics of practical value to agriculture.

The report also contains extended reports in relation to the county fairs of the state, made by members of the Board acting as a board of visitors under a resolution for that purpose.

1881.

During 1881 meetings were held at the following places and dates:

Harrisburg, January 26 and 27; Williamsport, June 7 and 8; York, October, 11 and 12.

The following new members were admitted into membership:

A. N. Perrin of Crawford, F. K. Patterson of Armstrong, F. Jaekel of Blair, W. J McKnight of Jefferson, S. Hoagland of Mercer, A. D. Shimer of Northampton, B. Vaughn of Sullivan, and G. P. Hays of Washington.

A committee were appointed to revise the by-laws and reported a few changes not of great importance. Since then the by-laws have remained unaltered.

Hon Thaddeus Banks, member from Blair, died, and at the annual meeting (January 26) resolutions of respect were reported by Messrs. Hood, Noble and Beebe (see page 5 of report).

The report of the secretary made reference to the following topics: Membership in the Board, reports of the Board, correspondence of the Board, commercial fertilizers, suppression of contagious pleuro-pneumonia, contagious diseases of live stock, new sources of profit, beet sugar, forestry and tree planting, silk culture, and also contained a financial report of the expenditures of the Board. Six of the honorary officers made extended reports upon topics connected with their respective positions, and the following topics occupied more or less of the attention of the Board:

Tobacco culture, application of fertilizers, potato culture, creameries, laws of line fences, laws of public highways, manual labor, grasses of Pennsylvania, experiment stations, roads and roadmaking, fertility of trees and plants, milk fever, Channel cattle, The bot fly, feeding of animals, field experiments with fertilizers, farmers institutes: the report also contained a full report of a large number of agricultural exhibitions in various portions of the state.

1882.

The meetings of this year were held at Harrisburg, January 25 and 26 Allentown, May 23, and 24, and Washington, October 18 and 19.

New members admitted to membership during the year were, James Y. McKee, J. Dindinger of Butler, Dr. E. W. Hale of Centre, G. Hiester of Dauphin, C. R. Lantz of Lebanon, Robt. McKee of Mercer and John McDowell of Washington.

The standing committees of the Board were first appointed and made their first reports during this year; certificates of membership were adopted and have been adhered to ever since; as special committee on forestry, Dr. W. S. Roland as chairman, made a report which has been since quoted all over the United States. A committee on freight discrimination was appointed and made a report; an extended and complete report on carp culture was made by Capt. M. P. Pierce, and the secretary made an extended report in relation to the suppression of contagious pleuro-pneumonia; the reports of honorary officers and those of members visiting county societies, were made as usual. The number of regular standing committees were extended and new ones added to the list.

The annual report of the secretary contained the following topics: membership, county agricultural societies, ensilage, farm wages and labor, commercial fertilizers, new products, diseases of live stock, cost of farm crops, cost of live stock, and during the year an unusually large number of topics were discussed and reported upon by our honorary officers, by special committees, by the standing committees and by members of the Board.

1883.

Meetings were held during 1883 as follows:

Harrisburg, January 24 and 25; Erie, August 8 and 9; West Chester, October 24 and 25.

The new members admitted during the year were Dr. Geo. W. Atherton, J. G. Zerr of Berks; J. D. Hicks of Blair, J. C. Thornton of Erie, A. D. Sutton of Indiana, J. F. Butterfield of Susquehanna, J. W. Mather of Tioga, and Emery Davis of Warren.

The number of annual reports was this year increased from 14,050 to 25,600 copies, the quarterly reports remaining unchanged in size and number. One of the leading features of the year was the full and complete report on dairy products by Eastburn Reeder, chairman of the standing committee on this topic. W. P. Hazard also re-wrote and amended the report of the Guenon commission, bringing it up to the year. The annual report of the year was the largest ever made by the Board and embraced three hundred and eighty-three pages of printed matter.

The report of the secretary embraced the following leading topics: Insect pests, cream separators, black knot, fertilizer laws, points in corn culture, and fluke in sheep. The standing committees on Dairy Products, Bee Culture, Textile Fibers, Silk Culture, Fruit Culture and the entomologist, chemist and other honorary officers, made their usual annual reports on topics appropriate to their respective positions. Dr. Warren, ornithologist of the Board, made his first official report, which paved the way for the publication of the "Birds of Pennsylvania," of which the legislature has ordered a second edition considerably enlarged.

1884.

Board meetings were held as follows: Harrisburg, January 23 and 24; Lock Haven, June 11 and 12; Bedford, October 15 and 16.

The new admissions to membership during the year were Leonard Rhone, A. L. McKibben of Beaver, Philip Frederick, of Union and James McCracken, Jr., of Jefferson.

The annual report of the secretary referred to the following topics: Meetings, reports, forests, imitation butter and cheese, roads and road laws, farm wages, county agricultural societies, forests and rainfall, diseases of live stock, abortion in dairy cows, carp culture, the crops of the Year, fertilizer laws of Pennsylvania and other states, and numerous other topics of general interest to the Board and to the farmers of the state.

The annual report, containing two hundred and eighty-two pages, was filled with matter of more than ordinary value and merit, including the reports of honorary officers, and standing and special committees.

1885.

During this year meetings of the Board were held at Harrisburg, January 28 and 29; Towanda, June 17 and 18; Lancaster, September 3 and 4; Bloomsburg, December 2 and 3.

The new members admitted during the year were Col. Victor E. Piollet, H. M. Wise of Butler, W. C. Packer of Northumberland, L. B. Speaker of Sullivan, H. H. Colvin of Lackawanna, Wm. Gates of Venango.

M. C. Beebe, member from Venango, died July 20 and was succeeded by Wm. Gates. The annual report of the year contained two hundred and ninety-two pages; in addition to the usual report of the secretary, containing twenty-seven topics, it contained the following papers: Peach culture by Thos. Meehan, questions relating to fertilizers by Prof.

Jordan, geology and soils by Prof. Lesley, the New York Experiment Station by Dr. Sturtevant, and sundry other practical and interesting papers.

The act of June 23, 1885, authorized the Board, for the first time, to hold farmers' institutes and appropriated the sum of one thousand dollars for the expense of institute work.

1886.

The meetings of this year were held as follows: Harrisburg, January 27 and 28; Scranton, June 16 and 17; Conneautville, October 13 and 14.

The new members of the year were F. Y. Clopper of Westmoreland, F. R. Miller of Warren and N. G. Bunnell of Wyoming.

At the Bloomsburg meeting a committee was appointed to make an examination into the status of the standing committees, and after consideration they reported in favor of certain named committees reporting at each meeting; after discussion the Board adopted the report of the committee (see report of 1886, page 14).

The report of the secretary embraced the following items:

Cost of fencing, cost of osage hedges, prices of farm products, farm wages by counties, Guenon system, potato rot, scientific feeding, appropriations to experiment stations, diseases of live stock, ropy or viscid, milk bounty law of 1885.

The botanist, chemist, ornithologist, meteorologist and other honorary officers made their annual reports, and sundry interesting and practical papers, read at the meetings of the Board, were also published. During this year the road question was brought into prominence by the Board and much of the interest which has since been shown in relation to road and road laws had its rise in the work of the Board.

The standing committees on Dairy and Dairy Products, Silk and Silk Culture, Wool and Textile Fibers, Fruit and Fruit Culture, Cereal Crops, Grasses and Farm Implements, made their annual reports which were published.

1887.

The meetings of this year were at Harrisburg, January 26 and 27; Bellefonte, June 8 and 9; Montrose, October 12 and 13, and at Lewisburg, December 7 and 8.

The newly admitted members of the year were Joseph Painter of Armstrong, H. W. Kratz of Montgomery, Peter Reeder of Lycoming.

Deaths of members during the year were as follows: J. S. Keller, February 22; D. H. Foresman, April 21; C. C. Musselman, August 21, and J. G. Zerr, December 3.

During this year the number of the reports of the Board was increased from 25,600 to 31,510 copies.

The size of the quarterly reports was increased from forty-eight pages to one hundred and fifty, and the number from 1,000 to 6,000, of which five thousand were for the use of the members of the legislature. This increased the reports annually made by the Board to over one thousand pages of printed matter, of which six hundred is in the quarterly reports and the remainder in the annual report. The annual appropriation for holding farmers' institutes was increased from one to three thousand dollars.

By its discussions, the influence of its members and the circulars

issued, the Board this year secured the repeal of the act offering bounties upon certain classes of birds and animals.

The secretary, honorary officers and some of the standing committees made their annual reports; the annual report contained three hundred and ninety-six pages, and was among the most interesting issued by the Board; owing to the failure of other organizations to supply their quota of matter it was more extended than usual.

1888.

The meetings of the Board during 1888 were held at Harrisburg, January 25 and 26; Warren, June 12, 13 and 14.

The new members admitted during the year were S. S. Diehl of Bedford, J. T. Shoener of Schuylkill and W. H. H. Riddle of Butler. An obituary notice of J. G. Zerr was read by the secretary and a committee prepared and presented appropriate resolutions relative to his death.

During the year farmers' institutes were held at the following points: Montrose, Mifflintown, Newtown, Lewisburg, New Castle, Washington, Mackeyville, Millville, Atglen, Pottsgrove, Lancaster, Honesdale, Gettysburg, Oxford, Hatboro', Mifflinburg, Berwick, Tunkhannock and York.

Full reports were made by the secretary, honorary officers and standing and special committees.

1889.

Meetings during the year were held at Harrisburg, January 23 and 24; Brookville, June 12 and 13; New Castle, October 23 and 24.

Dr. Elwood Harvey, member from Delaware, died March 3, and the proper obituary notice was prepared and read by the secretary.

Dr. E. E. Higbee, Superintendent of Public Instruction and *ex-officio* member of the Board, died December 13.

The usual annual reports of the secretary, honorary officers and standing committees are embraced in the annual report which contained four hundred and sixty-four pages, it being the most extended report yet made by the Board.

Farm Wages And Board Of Farm Hands.

In obtaining our usual annual statistics in relation to farm wages and the board of farm hands, we have adhered to our former rule of recognizing nine different forms under which the agricultural labor of the state may be classed, viz:

1. By the month, for the whole year, with board;
2. By the month, for "summer months" only, with board;
3. By the day for transient work as wanted, with board;
4. By the day with regular work in fair weather, with board;
5. By the day with regular work in fair weather, without board;
6. By the month for the whole year, the workman to board himself;
7. By the month for "summer months" only, the workman to board himself;
8. By the day for transient work as wanted (not regular) the workman to board himself;
9. By the day for work in harvest, with board.

It is safe to assume that of the hands employed at agricultural labor in the state, fully two-thirds are employed under bargains based upon the first three plans above named, and that those not thus employed,

have not, as a rule, regular work on any one farm, but must depend upon chance for work.

A majority are employed under the first form by which they secure work, board and wages during the whole year regardless of weather or other circumstances; and on nearly every farm more or less of the labor is performed under contracts based upon this plan; a man boarded at the farm house is always expected to be on hand to perform odd "chores" not done by the workman who boards himself; he is also expected to be at his post of duty earlier and often later than the man who must obtain his breakfast before he comes to his labor and get his supper after he goes home; it will also be noted that under the first and second form, estimating nine and one-half months as the duration of the work for the second form, the workmen receive about the same amount of cash per year, the only difference being that the employer does not have to board them during the season at which he has little or no work for them.

The result of this compilation of reports from each county will be found in another portion of this report; from this we obtain the following averages:

	<i>Minimum.</i>	<i>Maximum.</i>	<i>Average.</i>
1,	\$9 50	\$20 00	\$14 25
2,	11 00	23 50	17 67
3,	56	1 35	78
4,	50	1 20	78
5,	75	1 25	1 05
6,	16 75	30 00	22 60
7,	18 75	35 00	26 06
8,	95	1 50	1 14
9,	1 25	2 25	1 44

Selecting form No. 1, in which the hand is employed for the whole year and boarded by the employer, we find the following comparison of wages for the past fourteen years:

	<i>Minimum.</i>	<i>Maximum.</i>	<i>Average.</i>
1877,	\$8 33	\$18 00	\$13 25
1878,	8 50	15 00	11 25
1879,	8 00	14 50	11 00
1880,	8 75	19 75	12 00
1881,	10 50	16 00	13 25
1882,	9 50	19 50	13 70
1883,	9 75	19 75	14 00
1884,	11 50	20 25	14 00
1885,	12 25	19 50	14 10
1886,	9 50	16 50	13 07
1887,	10 00	20 00	13 07
1888,	8 50	18 50	12 90
1889,	8 50	18 50	13 15
1890,	9 50	20 00	14 25
Average, ..	\$9 60	\$18 12	\$13 16

In the returns showing the "estimated cost of boarding farm hands per day" we find the following average:

	<i>Minimum.</i>	<i>Maximum.</i>	<i>Average.</i>
1890,	25 cents.	50 cents.	38 cents.

At the average rate per day the cost of board per week would be two dollars and sixty-six cents. This amount does not, however, fairly show the exact comparison, for, as before stated, the hand who is boarded on the farm performs more labor than one who boards himself; in fact we think that most farmers will agree with us that the convenience of having a hand to perform odd jobs out of ordinary work hours is fully equivalent to his board. We however note in comparing the wages paid for the whole season to a man who boards on the farm and to one who boards himself shows a difference for the board amounting to eight dollars and thirty-five per month, or at the rate of two dollars and nine cents per week, to pay the workman for boarding himself. If we assume that our averages are correct and that the average workman will board himself for two dollars and nine cents per week, we have a balance of fifty-seven cents per week in favor of permitting him to do so. But, on the other hand, this difference is fully counterbalanced by the fact that the man who boards himself, and has to walk some distance for his meals, will spend more time at his meals and less at his work than a hand boarded at the farm house. Taking our figures as the basis of the calculation and supposing that the extra labor gained from the workman who boards at the farm house is not needed, we may assume that there is little or nothing gained by boarding farm hands at the farm house and that, all things considered, it is as economical to let them board themselves and thus save much labor for the household.

When we institute a comparison with the wages of men employed with board for "summer months" only, we have, for the past fourteen years, the following figures:

	<i>Minimum.</i>	<i>Maximum.</i>	<i>Average.</i>
1877,.....	\$12 00	\$20 00	\$16 25
1878,.....	12 00	18 75	15 25
1879,.....	11 00	16 75	14 50
1880,.....	11 75	21 50	16 75
1881,.....	11 50	21 00	17 25
1882,.....	12 00	22 50	17 25
1883,.....	12 25	22 25	17 00
1884,.....	14 25	23 00	17 75
1885,.....	13 75	22 75	17 75
1886,.....	12 00	22 00	17 75
1887,.....	12 00	20 00	16 00
1888,.....	11 00	20 00	16 35
1889,.....	12 00	24 00	17 50
1890,.....	11 00	24 00	17 67
Average, ..	\$12 03	\$21 17	\$17 07

Taking the figures of the year 1890 as a basis we find that the average wages per month paid where the man is boarded, is \$17.67 while the average paid where he boards himself, is \$26.06; this gives the latter a margin of \$8.39 per month, or \$2.09 per week, for boarding himself; in both cases the comparative allowance for boarding is the same, viz, \$2.09 per week.

When a comparison is instituted between the wages paid to the laborer for transient work (when wanted) and those given regular work during fair weather, both with board, there is no difference, both classes

receiving an average of 78 cents per day. But when we compare the workman at transient work with board and the one similarly engaged but boarding himself we find that there is a margin allowed for board amounting to \$ 2.52 per week.

In many sections the members of the family can perform all labor needed during the winter months, and as a natural consequence the farm labor, when additional help is required, is usually engaged under the second form given in our table, viz, by the month for "summer months" only, with board. The duration of this class of labor very much depends upon the location and the character of the farming operations: near our larger cities a hundred acre farm will readily employ two or three men for the whole year in hauling hay and straw to market, while at a distance from market centers one man will be sufficient. We may however, assume for eastern and southeastern Pennsylvania that this class of labor is employed for from eight and one-half to nine and one-half months. Assuming the latter as the usual time we find that, taking our table as a guide, such a workman receives \$167.86 annually, while the workman employed for the whole year receives \$171.00, showing a difference of \$3.14 to balance two and one-half months board.

From the table we find the average rate of wages in harvest, with board, is \$1.44, ranging from \$2.25 per day, in Philadelphia, to \$1.15, in Berks county; we also note that the difference between the wages in harvest and transient wages by the day (at common work) is thirty-six cents.

Cost of Farm Fences and Fencing Materials.

In the collection of statistics relating to the cost of farm fences and fencing materials, the following items of cost have been kept prominently in view:

1. Cost of chestnut rails (in the rough) per 100;
2. Cost of pointing chestnut rails, per 100;
3. Cost of chestnut posts (in the rough) per 100;
4. Locust posts (in the rough) per 100;
5. Hewing and mortising four-hole posts, per 100;
6. Hewing and mortising five-hole posts, per 100;
7. Cost of four-rail fence, ready set up, per panel;
8. Cost of five-rail fence, ready put up, per panel;
9. Cost of worm fence rails per 100;
10. Cost of worm fence, ready put up, per panel;
11. Hemlock boards (6 inches wide and 16 feet long), per 1,000 feet;
12. Pine boards (6 inches wide and 16 feet long), per 1,000 feet;
13. Chestnut posts (in the rough) for board fence, per 100;
14. Locust posts, in the rough) for board fence, per 100;
15. Hewing posts for board fence, per 100;
16. Cost of four-rail posts and board fence, per rod;
17. Cost of five-rail posts and board fence, per rod;
18. Costs of posts for wire fence (in the rough) per 100;
19. Hewing posts for wire fence, per 100;
20. Cost for four-wire fence, per rod, ready put up;
21. Cost of five-wire fence, ready put up, per rod.

In another portion of this report we give, in a tabulated form, the answers to these queries, arranged by counties, and in the following table we give the average prices or cost of each item for 1890, and for the purpose of comparison have added the figures for the same items, taken from our annual report of 1886:

	1890.	1886.
1. Chestnut posts, in the rough, per 100,	\$6 43	\$7 00
2. Pointing chestnut rails, per 100,	1 06	1 05
3. Chestnut posts, in the rough, per 100,	10 61	11 34
4. Locust posts, in the rough, per 100,	18 50	23 87
5. Hewing and mortising 4-hole posts, per 100,	6 23	6 50
6. Hewing and mortising 5-hole posts, per 100,	7 68	7 75
7. Cost of 4-rail post fence, per panel,	15	63
8. Cost of 5-rail post fence, per panel,	75	69
9. Cost of worm fence rails, per 100,	5 00	4 72
10. Cost of worm fence (put up), per panel,	46	42
11. Hemlock boards (16 feet long), per 1,000,	12 55	12 79
12. Pine boards (16 feet long), per 1,000,	18 43	18 25
13. Chestnut posts for board fence, per 100,	8 40	9 45
14. Locust posts for board fence, per 100,	14 30	18 00
15. Hewing posts for board fence, per 100,	2 89	79
16. Cost of 4-rail board fence, per rod,	82	79
17. Cost of 5-rail board fence, per rod,	90	90
18. Posts for wire fence, in the rough, per rod,	6 10	9 52
19. Hewing posts for wire fence, per 100,	1 98	.. . .
20. Cost of 4-wire fence (put up), per rod,	47	.. . .
21. Cost of 5-wire fence (put up), per rod,	59	.. . .

From the records of the Board we obtain the following estimates of the cost of erecting the different kinds of fence usually used on a farm. In modifying these estimates to suit his own views the reader can make such changes in the cost of the materials as are dictated by his neighborhood. The estimates given are from a portion of the state in which fencing materials are high and labor expensive.

POST AND BOARD FENCE.

Materials used.—Hemlock boards sixteen feet long, one board six inches wide, three boards five inches wide, one cap board five inches wide, chestnut posts.

Length of fence.—1,551 feet or 94 rods, 194 panels of eight feet each:

97 six-inch hemlock boards, 6 inches wide,	\$13 58
388 five-inch hemlock board, 5 inches wide,	16 06
195 chestnut posts, hewed and mortised,	23 40
100 pounds of nails,	3 50
Hauling materials four miles to line of fence,	9 00
Setting posts and nailing on boards, six days,	9 00
	<u>\$107 54</u>

POST AND RAIL FENCE.

Materials used.—Chestnut rails, 12 feet long, lapped one foot, pointed ready for driving, chestnut posts, four holes ready for use, distance same as before:

143 chestnut posts, in the rough,	\$21 30
564 chestnut rails, in the rough, 12 feet long,	67 68
Hauling material four miles to line of fence,	15 00
Mortising posts and pointing rails,	16 00
Setting fence, six days,	9 00
	<u>\$128 98</u>

POST AND RAIL FENCE.

Materials used.—White cedar rails ten feet long, lapped one foot, ready for driving, chestnut posts the same as before, distance the same as before:

156 posts, chestnut, in the rough,	\$23 40
620 white cedar rails, 10 feet long,	74 40
Hauling materials four miles to line of fence,	15 00
Mortising posts and hewing rails,	16 00
Setting fence, six days, at \$1.50 per day,	9 00
	<hr/>
	\$137 89

The cost per rod is as follows: Board fence, one dollar and fourteen cents; chestnut rails and posts, four to the panel, one dollar and thirty-seven cents per rod; chestnut posts and white cedar rails, four to the panel, one dollar and forty-six cents per rod.

Analyses of Commercial Fertilizers.

During the past year more than five hundred samples of commercial fertilizers have been sent to Dr. Frear, the chemist of the Board, for analyses; these samples were selected in different portions of the state by three regularly appointed agents of the Board under oath or affirmation; after all duplicates had been rejected the remainder were tested and the results are shown in a tabulated form in another portion of this report. The work of the chemist was not only carefully performed but in all cases duplicate tests were made; in some cases, or where any doubt existed, a third test of the same sample was made.

Inasmuch as these samples were selected from goods actually in the market and often in the hands of consumers, they may be assumed to fairly and justly represent the brands named. In some few cases the same brand, from samples selected in different parts of the state, has been twice tested and the results placed side by side for comparison. In such cases they were selected by different agents and under different conditions.

During the year our agents, acting under instructions, have endeavored to visit points not reached during previous years; while this plan has added somewhat to the expenses it has proven a decided advantage, inasmuch as it removes the possibility of special lots being sent to certain points, under the supposition that they will be sampled and tested.

In our valuation the same prices have been used as were adopted last year; during a portion of the time the market would have authorized the use of somewhat lower figures in some kinds of supplies, but taking the average of the whole year, we have no cause to be dissatisfied with the result, and we believe them to be fair to both manufacturer and consumer. The usual time for a modification of values is at the commencement of the fertilizer year (August 1); it is yet too soon for us to indicate changes, but the opinion of those best posted is that the variations, if there are any at all, will be slight and of a nature which will retain the average of the year at about the same figures. Any change will prevent the use of our analyses list as a means of comparing the value of any particular brand with that of other years, and hence none will be made unless the variation in values is such as will warrant the belief that they are permanent.

A carefully average and examination of our analyses tables shows that the analysis of the average sample of "complete fertilizer" has been as follows:

Moisture,	12.2	Potash,	3.04
Soluble phosphoric acid,	6.36	Nitrogen,	1.86
Reverted phosphoric acid,	2.98	Commercial value,	\$30.06
Insoluble phosphoric acid,	3.13	Selling price,	23.64

The analysis of the average sample of acidulated South Carolina rock has been as follows:

Moisture,	12.16	Insoluble phosphoric acid,	2.29
Soluble phosphoric acid,	10.01	Commercial value,	\$20.68
Reverted phosphoric acid,	2.86	Selling price,	17.14

The analysis of the average sample of ground bone, is as follows:

Moisture,	6.32	Commercial value,	\$6.55
Insoluble phosphoric acid,	24.15	Selling price,	\$0.90
Nitrogen,	3.54		

In all mixed fertilizers an addition of four dollars per ton was made to cover the cost of bagging and mixing, but in the case of acidulated South Carolina rocks and bone no such addition was made; it therefore follows that we have, in complete fertilizers the sum of \$1.39, in acidulated South Carolina rocks \$3.54, and in ground bone \$5.65, in addition to the items given. In this connection it should be remembered that in addition to the cost of mixing and bagging (for which we have made an allowance of \$4.00 per ton), the cost to the manufacturer includes interest on plant, freight and commissions to agents; after giving these their fair value we think that our results in valuation show that they were based upon figures approximately correct.

The work of the year has developed nothing new in the trade; the introduction of phosphate from furnace slag, and the use of phosphates of alumina as a source of phosphoric acid, were briefly alluded to last season, and the report of Dr. Frear, in another portion of this volume, gives a more minute account of their manufacture and value; the lack of practical experiments prevents our being able to attach a satisfactory value to phosphoric acid from either of these sources and hence we have not introduced them into our tabulated analyses. The phosphoric acid as derived from phosphates of alumina, being nearly all in the reverted form, would indicate that we are justified in giving it the same valuation as is accorded to "available" phosphoric acid from other sources, but as but little (if any at all) reaches the consumer, we can well afford to wait another season for the results of practical tests which will probably show us their true position.

Each season shows the beneficial effect of the fertilizer law by the decrease in the number and amount of low grade goods placed upon the market, and it is found that of those found to be of low grade and therefore condemned under the act of June 28, 1879, not over one hundred tons in all were sold this year; a careful review of our tabulated analyses will show that the brands which have a commercial value below their selling price, are decreasing; an examination of our records will also show that the amount of such low grade goods actually sold is surprisingly small. We are satisfied that in this respect alone the enforcement of the fertilizer law has annually saved our farmers not less than \$300,000 in their outlays in this direction. Some of our most reliable manufacturers estimate this saving at \$3.00 per ton on the total output of fertilizers; this is equivalent to not less than \$375,000 annually.

The two following analyses illustrate the two brands which were this year found defective in the points required by law, and their sales with the formerly recorded analysis was forbidden:

No. 454 "Honest John Phosphate:"

Moisture,	16.40	328 lbs. per ton.	\$0 24
Phosphoric acid,	0.14	3 " " "	
Reverted phosphoric acid,	1.10	23 " " "	1.73
Insoluble phosphoric acid,	2.77	55 " " "	1.65
Potash,	0.68	14 " " "	0.84
Nitrogen,	0.25	5 " " "	0.9
<hr/>			
Comparative commercial value per ton,			\$5.36
Selling price per ton,			<u>15.00</u>

No. 322 "Improved Phosphate."

Moisture,	3.00	Bagging and mixing.	\$4.00
Phosphoric acid,			
Reverted phosphoric acid,	0.47	9 lbs. per ton,	0.68
Insoluble phosphoric acid,	0.38	8 " " "	0.24
Potash,	1.93	39 " " "	2.34
Nitrogen,	0.20	4 " " "	76
<hr/>			
Commercial value per ton,			\$8.02
Selling price per ton,			<u>27.00</u>

No. 454 was found to be the ashes from a garbage furnace, and being made from valuable material, gave a fertilizing value considerably above that of ordinary wood ashes.

No. 322 was believed to be largely composed of furnace ashes, although the manufacturer assured us that good materials were made use of. Both agreed to sell the goods for what the official analysis showed them to be; if they are offered under their former claims, the manufacturers and agents become liable to the penalty set forth in the act of June 23, 1879.

Constitutionality of the Fertilizer Law.

By an act of the legislature the State of North Carolina levies a license fee of \$500 per brand upon all commercial fertilizers offered or sold within the state and legalize the confiscation of all unlicensed fertilizers found in the state. The fund arising from these fees, amounting to over \$35,000 is devoted by law to the support of the State Department of Agriculture and to the Agricultural and Mechanical College.

Acting under this law, the Department of Agriculture recently seized a lot of unlicensed fertilizer and the manufacturer appealed to the court for a decision as to the constitutionality of the law. As a result the act was pronounced to be unconstitutional, and from this fact some have assumed that all acts, including that of our state, providing for the inspection of fertilizers, are alike unconstitutional. Such a decision or opinion could only have been arrived at before reading the decision of the court, for it clearly supports the act of our own state and affirms its constitutionality and force.

The opinion of Judge Seymore clearly states that had the law been passed for inspection purposes only, and had not the amount levied been in excess of that required for inspection purposes, it would have been constitutional. He also declares that the unconstitutionality of the act is due to the fact that it devotes the license fees to other purpose than those of inspection.

A careful reading of the decision of the North Carolina court in this case will show that the act of Pennsylvania was practically upheld and declared constitutional because it devotes the fund exclusively to inspection purposes.

But aside from this it may be justly claimed that the North Carolina decision in no way affects the Pennsylvania act because the latter nowhere imposes a tax or fee upon the non-resident manufacturer; Section third of the act of June 28 1879, provides that "Any person selling, offering or exposing for sale any commercial fertilizer without the analysis required by section one of this act, or with an analysis stating that it contains a larger percentage of any one or more of the above mentioned constituents than is contained therein, or for the sale of which all of the provisions of section two have not been complied with, shall be deemed guilty of misdemeanor, and on conviction shall forfeit a sum not less than twenty-five dollars and not exceeding one hundred dollars for the first offence, and not less than two hundred dollars for each subsequent offence, one half of which shall be for the use of the informer and the remainder for the county in which conviction is secured."

From this it will be noted that the penalty is not levied upon the manufacturer but upon the person offering for sale or selling the goods; this point has been so strongly brought out by the North Carolina decision that some manufacturers in the state ask that the law be carried out literally and that the fee be assessed against every agent offering or selling the goods of non-resident manufacturers.

It has always been the rule with non-resident manufacturers to pay the proper license fee, but we fail to find anything in our law which makes it obligatory upon them, but in all cases where they do not do so, each resident agent would clearly be compelled to take out the license and pay the proper fees himself. The effect of this can be best illustrated by the position of one non-resident firm who have ten brands on sale in the same, and who pay a license fee of \$200 for their sale by over seventy agents in the state, who on an average handle five brands each.

Should the above view of law be concurred in, each of these agents would be compelled to pay a license fee of not less than fifty dollars, amounting to thirty-five hundred dollars for all, whereas the payment by the non-resident manufacturer only requires a fee of two hundred dollars.

In his opinion in relation to the North Carolina case above alluded to, Judge Seymore, in alluding to the police power of a state, uses the following language.

"If it be anything but what the act itself seems to contemplate, a tax on an occupation or a privilege tax, it is because it is used to secure an inspection of the commercial fertilizers before they can be sold in North Carolina. Such a tax is constitutional, but only within the limits of the constitution. It can only be sustained to the extent that it is absolutely necessary for the purpose of paying the expenses of inspection.

"But the court is released from all embarrassment in this respect by the fact that the act in question declares that the tax is not needed for inspection purposes, for in section twenty-two, five hundred dollars of the money received from the tax on fertilizers is appropriated to the North Carolina Industrial Association, and in section twenty-three, forty-one thousand dollars is given to pay the expenses of the Department of Agriculture, including \$20,000 for the completion of the oyster survey, and all other revenues from the tax on fertilizers shall be appropriated to the establishment of an Agricultural and Mechanical College."

When before the senate and house committees of agriculture, during the consideration of our fertilizer law by the legislature, the writer contended that there was in reality no conflict of interest between the honest manufacturer of fertilizers and the consumer, and that in all essential points their interest were identical; he also insisted that if the law failed to extend proper protection to the honest manufacturer as against the dishonest one, it would not only fail in the desired and intended effect, but would in time fail to command the support of all interested.

It was proposed by some members of the committee that the fund arising from the license fees should be paid into the state treasury just as other license fees were paid, and that the legislature should annually make an appropriation sufficient for the purposes of fertilizer analysis and inspection, believing that this would be fatal to the law, the writer used all reasonable influences to have the present section five placed in the law so that as it now stands the fees from the fertilizer license "constitute a special fund from which the cost of such analysis shall be paid."

The result of eleven years of practical experience with our law fully confirms the claims made above, and it to-day interposes a bar to the dishonest manufacturer and protects both the consumer and the honest manufacturer.

Recorded Analysis.

The act of June 28, 1879 (to regulate the manufacture and sale of commercial fertilizers), provides, "That every package of commercial fertilizer sold, offered or exposed for sale, for manurial purposes, within this commonwealth, shall have plainly stamped thereon the name of the manufacturer, the place of manufacture, the net weight of its contents, and an analysis stating the percentage therein contained of nitrogen or its equivalent in ammonia in an available form, of potash soluble in water, of soluble and reverted phosphoric acid and of insoluble phosphoric acid."

Section two of the same act provides that "Every such manufacturer shall at the same time (as he files other papers) file with the Secretary of the State Board of Agriculture a copy of the analysis required by section one of this act."

A careful reading of the above quotations will, we think, convince any one that the intent of the legislature and the law is, that the manufacturer shall place upon every package an analysis which will enable the purchaser to judge of what is contained therein, and that there might be no deception practiced, it compels the manufacturer to practically guarantee the analysis by compelling him to file a copy in the office of the Board of Agriculture, and makes him liable to a heavy penalty if the goods are not found up to this guarantee, for by the provisions of section three of the same act, the purchaser, if he finds that the contents are not up to the guarantee upon record and on the bag, is given the right to one-half of the penalty, to be recovered by law.

It has been decided by excellent legal authorities that, under the provisions of the above quoted sections, the Board of Agriculture has the right to insist that the manufacturer shall place a specific and exact guarantee upon each sack or package placed upon the market, and that failing to do so he becomes liable for a failure to comply with the provisions of the act and subject to the penalties of section three. It then becomes an interesting matter for adjudication as to what constitutes

a guarantee of the contents of the packages; in all other cases an obligation to guarantee contents carries with it the duty to state in specific figures the *exact* amount of each constituency guaranteed. Custom has permitted manufacturers to use, in their guaranteed analysis, a minimum and a maximum guarantee, and the purchaser has learned to think that he is safe in assuming that an average between the two is, at least, guaranteed to him. A reasonable margin between a minimum and a maximum guarantee will perhaps work no wrong to the consumer and give the dishonest manufacturer no room for fraud, but manufacturers have widened this margin until, in some cases, it has exceeded all reasonable limits and it becomes the duty of those charged with the enforcement of the law to call a halt and demand that the provisions of the law shall be strictly complied with; but in so doing there is no desire to make the law unnecessarily burdensome to the manufacturer nor to require anything unjust of him.

As an illustration we may give the following analysis, which, though it is an extreme case, is nevertheless on record in the office of the Board:

Soluble and reverted phosphoric acid,	6 to 10	per cent.
Insoluble phosphoric acid,	2 to 4	per cent.
Potash,	3 to 9	per cent.
Ammonia,	2 to 6½	per cent.

If we now assume this first or minimum analysis, shown by the first perpendicular row of figures, to be the correct one, and apply to it the valuations used by the Board, we find it to represent a fertilizer worth to the consumer at least twenty-two dollars per ton; if, on the other hand, we assume the maximum or last analysis to be correct we find it to represent a fertilizer worth fifty-four dollars per ton. We admit that this is an extreme analysis, but we use it to illustrate the point which we wish to make, viz., that a wide margin between the minimum and maximum guarantee is, at least indirectly, unfair to the consumer, and contrary to the intent and letter of the law, and that it is therefore the duty of the Board to correct the evil.

As before stated, it has been decided that the Board is warranted by the requirements of the act itself, to demand that manufacturers shall state their guarantee in one set of figures, and many of our leading manufacturers have this year done so, and thus place it within the power of the consumer to know, at least within reasonable limits, what he is buying.

In other cases there has been a disposition on the part of some manufacturers to violate or evade the requirements of the act by stating the constituents in a different form from that required by law; inasmuch as this difference in every case enables them to use a larger number, with but little (apparent) change in the lettering, the intent is evident and not to be mistaken.

This, in the case of ground bone, some manufacturers state the percentage of "bone phosphate of lime;" this of course contains or included the phosphoric acid, but inasmuch as the law requires that the percentage of phosphoric acid shall be stated, and as "fifty per cent. of bone phosphate of lime," is (practically though not exactly) twenty-five per cent. of phosphoric acid, the unfairness of the analysis becomes evident. The Board has this year insisted that the amount of phosphoric acid shall be stated in all analyses of ground bone, and the step has been commended by many of our leading manufacturers and dealers.

And here we may present another instance of the injustice (to the consumer) of a wide margin between the minimum and maximum guarantee; in some analyses offered, the figures have been "Phosphoric acid, fifteen to twenty-two per cent," and the claim has been made that with the varying character of bones, it is difficult to make a closer guarantee, but when some manufacturers can make an exact guarantee and when other manufacturers purchase all of their supplies on a definite and exact guarantee, we fail to see why they cannot do so when dealing with the consumer also. In the analysis which we have quoted, the ammonia being the same in both cases, the minimum guarantee would give us an article of bone worth twenty-six dollars and forty cents, while the maximum one would introduce an article worth thirty-three dollars and forty cents per ton; a difference of seven dollars per ton, or about twenty per cent., at the present prices of ground bone.

In stating the percentage of potash, some manufacturers have been in the habit of giving "sulphate of potash," which is clearly a violation of the law which requires a statement of "potash;" inasmuch as the difference of the figures in the statement of potash and sulphate of potash are largely in favor of the latter, the reason for this manner of recording the analysis became apparent. This year we have insisted upon the statement of the percentage of "potash" and it, like the preceding change, has resulted to the benefit of both consumer and manufacturer.

In some cases the manufacturer has stated the ammonia as "sulphate of ammonia;" here again we find the same misleading effect, by which it is sought to inform the more careless class of purchasers that there is more of a given ingredient than is actually guaranteed to him.

Manufacturers have been accorded the right to state the analysis as "twenty to twenty-five per cent. of phosphoric acid, equivalent to forty to fifty of bone phosphate of lime," because they first state the amount of phosphoric acid and then its equivalent in bone phosphate of lime; the Board is not empowered to rule that nothing except that required by law shall be upon the analysis, but it has the right, and it is its duty, to see that all that is actually required by law is stated in full.

Sources of Phosphoric Acid.

In the early history of the fertilizer trade, when the only available source of phosphoric acid was ground bone, and when bone and guano were the only recognized sources of nitrogen, the compounding of commercial fertilizers was a comparatively simple matter, and the aim was, mainly, to render the phosphoric acid of the bone more readily available as plant food and to enable the crop to reach it by a short cut, instead of the slower way of awaiting the action of ground bone. At the present time we find the problem much more complicated until with at least a dozen sources of phosphoric at his command, the manufacturer who wishes to guard himself and his customers from fraud and imposition, must employ a good chemist. With bone as its source the result as to phosphoric acid was assured, but when, as now, five or six different sources furnish the make, up of the phosphoric acid, potash and nitrogen of our fertilizers, it is not enough to completely and thoroughly understand the nature of the material obtained, but it is also necessary to know the exact nature of the action of the different chemicals upon each other, after they have been compounded, for it is well known that certain chemicals, all good enough of themselves and

furnishing the sought for constituent in proper condition, will, when mixed, undergo certain changes which may entirely alter the character of the most valuable material used. Thus it is possible to render a given source of phosphoric acid available by the proper addition of sulphuric acid, but it is also possible to add to the mixture an ingredient, which, however good of itself, may render the phosphoric acid unavailable and revert it to its original condition; and it is possible in this way, without the proper supervision of a chemist, to neutralize the otherwise good qualities of a fertilizer, and the writer could readily name several honest and well meaning firms who have lost their money and have been forced out of the business, not because they did not try to make a good article or because they did not use good enough material, but because, after having furnished the material for a good fertilizer they added something else which neutralized their previous efforts, and in the absence of careful chemical analysis, rendered abortive their well-meant efforts.

As usually met with in fertilizers and in fertilizer supplies, we find the phosphoric acid in three forms, differing in value and availability with the composition of each. Chemists have assigned to these three forms the names of "soluble," "reverted" and "insoluble" phosphoric acid; the former consist of one portion of lime, one of phosphoric acid and two of water; the second form consists of two of lime, one of phosphoric acid and one of water; the third consists of three of lime and one of phosphoric acid. They are known to chemists as "mono-calcic," "bi-calcic" and "tri-calcic" phosphate.

In the chemical analyses as usually recorded, the mono-calcic and bi-calcic are united under the term "available" phosphoric acid, because chemists practically admit that there is very little, if any, difference in their value to the farmer. The insoluble of tri-calcic is the least valuable form, not because it does not contain the same material as the others, but because it contains it in a less valuable form, just as ground bone contains all the fertilizing elements of dissolved bone, but because it is in much less readily available form.

In his selection of his source of phosphoric acid, the manufacturer is compelled to have reference to the expense of rendering the tri-calcic phosphoric acid "available" or of changing it from that form to that of the mono-calcic or bi-calcic form, for the condition of chemical science, as applied to fertilizers, is such that only the most readily available forms will find favor with purchasers. He cannot always utilize the lowest priced phosphatic material at his command for the effect of other ingredients upon some of them is such as will completely defeat his efforts to compound a good fertilizer. He may select some of the lower priced phosphatic guanoes and find that the percentage of iron which they contain will defeat his efforts to make them available; he may find natural deposits quite rich in phosphoric acid, such as exists in Northumberland county in this state, and yet find them comparatively valueless for his purpose because the iron present thwarts the action of his chemicals. It is at this point that the services of his chemist comes to his assistance and shows him why it is that certain chemicals which contain, in an unmixed state the, very elements he wants, will fail to show them after mixing, or at least after they have remained in a mixed condition for some length of time; the chemist will show him, possibly, that one of the ingredients added has "reverted" his "available" phosphoric acid to a less valuable form.

We may enumerate the following among the most common sources of phosphoric acid for fertilizer supplies:

Phosphatic guanoes, bone ash, South Carolina rock, bone black, ground bone, basic slag, dissolved bone, phosphatic earths.

There are also sundry other sources from which he may obtain phosphoric acid in mixture with nitrogen and other elements, but the above include the leading sources of phosphoric acid only.

Phosphatic guanos are the accumulated dung of fowls, deposited usually on islands in the ocean and in climates having sufficient rainfall to remove the nitrogen, but not sufficient in amount to remove the much less soluble phosphoric acid, such deposits are usually mixed with a greater or less amount of phosphates of alumina and iron in addition to the prevailing phosphate of lime; and it is the presence of these ingredients which rob these deposits of much of their value to the manufacturer of fertilizers, because, when present in quantity, they neutralize all efforts to render the phosphoric acid more readily available. A large manufacturing company has recently been established to work under a patent which, it is claimed, will remove this difficulty entirely and render available this class of fertilizing supplies.

With ground bone and bone meal the reader is sufficiently familiar to need but little additional information; as usually placed upon the market it contains about fifty per cent. of bone phosphate of lime and four to five per cent. of nitrogen; the addition of sulphuric acid furnishes us with the "dissolved bone" of commerce which is simply ordinary ground bone rendered more readily available by the addition of an acid which, by its stronger affinity for lime, removes one or more portions of this element and with it forms new compounds, thus leaving the phosphoric acid and lime free to combine in proportions which gives us the acid element in a more valuable form.

Bone ash or bone black, as their names would indicate, are composed of ground or crushed bone reduced to fineness by burning, with the loss of their nitrogen. These supplies formerly came from South America and other regions where the bones were used to heat the fat of animals (cattle) and thus reduce the tallow to a merchantable form. The demand for this form of phosphatic supply has given rise to their manufacture, in connection with the manufacture of other chemicals, by burning coarsely broken bones in closed retorts; all other and volatile materials are driven off and the residue represents the bone black of commerce, which usually contains from fourteen to twenty-six per cent. of phosphoric acid.

South Carolina rock and the mineral phosphates include a long list of sources which we have not the space to enumerate or explain here, but which, in different countries furnish a varying proportion of phosphoric acid, but which in our own country seldom compete with bone and South Carolina rock.

South Carolina rock is usually classified either as "land" or "river" rock in accordance with the location of the deposit and varies slightly in color, that from the river being the lighter in color and usually of a yellowish or greyish hue. Its value as a fertilizer, in its natural condition, is still somewhat a matter of dispute and some claim that if finely ground it is, in its condition as first obtained, a valuable fertilizer and that it will produce excellent and profitable effects without the action of acid. Thus far it has not met with favor at the hands of the consumer and all attempts to introduce it in its natural state have failed. But the experiments at some of our experimental stations

would indicate that it may prove of value simply ground and applied in its natural chemical condition.

As taken from the river and river bottoms its composition varies somewhat, but the average will yield from twenty to twenty-five per cent. of phosphoric acid. When carefully ground and acidulated, it will yield, taking the average of a large number of samples analyzed by the Board, eleven to thirteen per cent. of "available phosphoric acid" and two to three of insoluble, and as a fertilizer *furnishing phosphoric acid only*, it has now no competitor in point of cost and economy.

A recent addition to the list of phosphatic materials available for fertilizers is found in the patented process by which phosphoric acid is extracted, sometimes as a by-product, from earths rich in phosphate of alumina; in such cases we find it almost exclusively in the bi-calcic or "reverted" form and the amount thus far placed upon the market is not sufficient to demonstrate its value as a competitor with South Carolina rock, although the market takes all that is now manufactured and would absorb more; whether it will pay solely as a source of phosphoric, unaided by other products, is not demonstrated.

Within the past three years phosphoric acid manufactured from the refuse basic slag of our steel works has been placed on the market under the name of "odorless phosphate," but we thus far need practical field experiments to demonstrate its position as a competitor with ground bone and South Carolina rock. The report of Dr. William Frear, chemist of the Board, in another portion of this volume, will deal specially with the comparative practical value of this and other forms of phosphoric acid, and the reader is referred to his report for more definite information. In Europe, where it is not in such close competition with dissolved or acidulated South Carolina rock, its effect appears to have been excellent, but in our country, like all other phosphatic supplies, it must submit to a test as compared with the cheap source now offered by our phosphatic beds in South Carolina and Florida.

In some portions of the United States, in limited amounts, and in Canada in large amounts, deposits of a mineral phosphate known as apatite have been found, but seldom of sufficient purity to enable the manufacturer to warrant a certain percentage of phosphoric acid and this with the exceeding great difficulty of reducing it to a proper degree of fineness have limited its ability as a competitor of South Carolina rock, but in Europe where it is found in a purer condition, it is much used in fertilizers.

Several deposits of earth quite rich in phosphoric acid are known to exist in our own State, and in an advanced stage of scientific research they may be rendered available by the discovery of some means by which the retarding influences of other constituents may be removed and the phosphoric acid made available.

Sources of Potash.

Except as they are able to utilize the by-products or waste of other manufactures, the manufacturers of commercial fertilizers are practically confined to the following for their supply of potash: Sulphate of potash, nitrate of potash, kainite, muriate of potash, wood ashes and ashes from cotton seed (either the whole or the hulls alone), and in some few cases the ashes from refuse tobacco.

Sulphate of potash is one of the German potash salts produced

naturally, but usually in combination with some other form of potash, generally that of the muriate; being a natural product, its proportion of potash necessarily depends upon its purity and the honesty of the persons who take it from its natural beds; in its best condition it contains from thirty-one to thirty-four per cent. of potash; it should be of a yellowish color; it is much used for special tobacco fertilizers and for other crops upon which the muriate has a deleterious effect; in the usual condition of the market, potash derived from this salt is more expensive, but the difference in price is made up by the increased value in special fertilizers; for ordinary complete fertilizers some other form is usually selected.

Nitrate of potash is practically a somewhat impure form of saltpetre; its cost, as compared with other forms of potash, prevents its extensive use in fertilizers, except for a limited and special application. Inasmuch as it contains more or less nitrogen, it may be used in special cases where, in addition to the value of the potash, that of the nitrogen can be utilized, but practically it is displaced by other forms of potash salts and other forms of nitrogenous matter which furnish either element at a less cost per pound.

Kainite is by far the most plentiful, economical (except for specific purposes) of all of the natural potash salts; as found in the trade it usually contains from twelve to fourteen per cent. of potash, but this altogether depends on the honesty of the parties who remove it from the Stassfurt beds in Germany; on this account, it should always be purchased upon a reliable guarantee as to the per cent. of potash it is to contain. In its natural condition it is usually mixed with other sulphates, such as sulphates of soda and magnesium; it very often contains over thirty per cent. of common salt and a considerable percentage of sulphate of lime or common gypsum; the large percentage of salt often renders fertilizers in which the lower grades of kainite is used, injurious to the young sprouts of the growing crop; all farmers mixing their own fertilizers should be very careful to purchase this salt of none but reliable firms, and then only on a guarantee of purity and a fixed percentage of potash.

The well known source of potash in wood-ashes perhaps needs but little description at our hands, yet we find that in many cases its use by the farmer who compounds his own fertilizers, leads to great disappointment and vexation, and that often the firm who furnishes the phosphatic and nitrogenous portion of the supplies, is blamed for results due to the use of wood-ashes and to the ignorance of the mixer, of the relative effects of the different ingredients used.

The proportion of potash contained in ashes depends very much upon the kind of wood used and the degree of heat used in burning it; if the heat runs above a certain point, it is claimed that the product in ashes, at least so far as its potash is concerned, enters into an insoluble form and loses much of its value to the soil and crop.

Our analyses show that the proportion of potash in unleached wood-ashes will vary from two to eight per cent. and that the average will not run above from five to six per cent.; in some cases of soft wood ashes, the percentage of potash has run as low as two per cent., and in the cases of that from hickory and other hard woods it has run as high as an objection to the use of this source of potash for mixed fertilizers lays in the fact that it may release nitrogen and render otherwise "available" phosphoric acid insoluble; in this way it may readily injure an otherwise good fertilizer to a much greater extent than the

addition of the potash can improve it; as a source of potash in mixed fertilizers it should be avoided; it is far safer to put it on the soil unmixed. Its value (price) should altogether depend upon freight and percentage of potash which it yields; in most cases it will be found that long distance freights will make it a very costly form of potash; in such cases some of the high-grade salts are greatly to be preferred because of the saving in freight, and if bought under a guarantee of the certainty of the product in potash.

Other forms of ashes are sometimes utilized; ashes from tobacco-refuse is rich in potassic matter and may thus be utilized as a fertilizer; the ashes of cotton-seed refuse is much used in the neighborhood of ginning mills; in some few cases the whole seed is burned, but usually this has too high value for its oil, and hence only the refuse after the oil is extracted, is burned; in some cases the seed is hulled before being used for oil; in such case the ashes are rich in potash. The ashes from the furnace in which the offal of Pittsburgh is burned by natural gas, was supposed to be rich in potash, but tests made under the direction of the Board showed but sixty-eight hundredths (fourteen pounds per ton) of potash, and gave the ashes a total commercial value of five dollars and forty-one cents, mainly due to the phosphoric acid found in it.

All the marls of New Jersey contain more or less potash, but usually in a form not readily available as immediate plant food; some of them have been found to contain five per cent. of potash, which renders them about equal to ordinary wood-ashes, except that the potassic material is in a less valuable form.

Marl, coal-ashes, lime-ashes and other form of refuse ash are sometimes used as "fillers" in fertilizers; for this purpose they add some potash, but, from their low cost, are a fraud upon the consumer.

Roads and Road Laws.

In another portion of our report the reader will find the questions of roads, road repairs and road laws fully discussed and deductions drawn, and we do not propose here to enter into an extended examination, but merely to suggest and outline some of the possibilities which may follow radical changes and to suggest the possibility that the desired point may be reached without any radical change in our present laws.

The results of the discussions at more than fifty meetings and farmers' institutes held by the Board during the present year, all plainly indicate that there prevails a strong desire for some improvement in the condition of our public roads, but, after a careful examination of these discussions, the reader will probably note that while many suggestions have been made, but few of them are practical and these few propose radical changes, which at best are always dangerous especially when they, as in the present case, lead us into new and untried ground. As is usual, it has been found much easier to criticise and find fault than to suggest a practical remedy.

Upon one point we however find that nearly all are agreed, and that is that the retention of the clause of the act of 1834, which permits the taxpayer to work out his tax, however it may have been suited to the condition of affairs which prevailed then, is now burdensome and expensive, and that the wisdom of its repeal each year becomes more and more apparent. The question as in many cases brought directly before the local farmers' institutes for a vote, and in all cases but one the

decision was in favor of the repeal; and in that one case it was afterwards ascertained that the vote was misunderstood and that the majority of those present were in favor of repeal.

This provision of the act of 1834 is as follows: "*Provided, That before issuing the duplicate and warrant for the collection of road taxes, it shall be the duty of the supervisors of every township to give notice to all persons rated for such taxes, by advertisement or otherwise, to attend at such times and places as such supervisors may direct, so as to give such person full opportunity to work out their respective taxes.*"

The leading argument against the repeal of this portion of the act of 1834, is that there are in every township persons who are assessed for road taxes to very small amounts and that in such cases a payment in cash would be a hardship and inconvenience. On the other hand it has been shown that in a majority of cases it is this class which furnish the most unprofitable workmen in road repairs.

In some of the counties, by special laws, the supervisors divide the roads into short sections and sell the work of repairing them to the lowest bidder; at the end of the year a balance is struck with each tax payer in the township and if his dues for road work exceed his road tax, the balance is paid him in cash; and if, on the other hand, there is a balance against him, it must be paid in cash. Thus far this plan, which is very nearly equivalent to a cash payment, has not been found to work serious injury or inconvenience to any one.

With this clause of the act of April 15, 1834, repealed the supervisors will be in a situation to pay their labor bills in cash, and it has been claimed they may in this way obtain at least one-third more work for the same amount of outlay.

With this clause out of the way we must decide whether the objectionable condition of the roads so much complained of is due to imperfections in the law itself or whether they may not be due to an imperfect system of carrying into effect the provisions of the law. In the solution of this point we may assume that the supervisors have almost autocratic power; they can take material for road repairs wherever they may find it suited to their purpose; they are the judges as to how, when and where the roads shall be repaired; they may say who shall or shall not work upon the roads; they will be responsible for each man whom they employ, and it will be their duty to see that he gives a fair equivalent for his wages.

Their only limit appears to be as to the amount of road tax they may levy, as this is decided by the following provision of the act of 1834: "It shall be lawful for the supervisors of any township to lay a rate of assessments, not exceeding one cent on the dollar, upon real and personal estate, offices, trades and occupations, for the purpose of laying out, opening, making, amending or repairing of roads and highways, and for the making and repairing of bridges, and for such other purposes as may be authorized by law." The only case in which they are permitted to exceed this limit is to pay debts due a former supervisor or overseer of the poor.

In a township with which the writer is familiar, the present road tax is less than four mills on the assessment; the roads are in reasonable repair but many of the taxpayers would like to see an improvement; the present levy gives the supervisors \$3,000; a rate of ten mills would give them \$8,500, or an increase of \$5,500 which might be used for permanent improvement of any character decided upon. Based upon the

estimates furnished the Board, the amount would macadamize about three miles of the road each year.

It must then be admitted that our present laws give us the power to have excellent roads and to effect permanent improvements within certain limits only governed by the expenses; if this limit (ten mills on the dollar of assessment) is not sufficiently high, may it not be better to amend our present law and increase the rate, rather than to enact new laws which may lead us into trouble and almost endless difficulties?

It is believed by many that the amount which would be gained by the adoption of a cash system, added to the increased rate allowed by law, would give the supervisors the control of all the funds necessary for gradual permanent improvements and that they can thus be accomplished without any radical change in our laws or without imposing enormous taxes upon our people.

Sorghum and Beet Sugar.

The correspondence of the Board indicates a revival of the interest in the home manufacture of sorghum and beet sugar; in all cases such inquirers have been directed to the complete history of the manufacture of sugar from sorghum as given in the last annual report of the board.

Thus far no successful manufactory of beet sugar has been established east of the Rocky Mountains; recently one has been established at Grand Island, Nebraska, and a fair test will be given to beet culture and to the manufacture of beet sugar. The company has ample capital, and has contracted with farmers for the supply of beets, which have been coming in quite as rapidly as was expected. The railroads have given the farmers such rates as will, it is claimed, enable them to ship the beets at any distance less than one hundred miles from the factory, and still have a fair margin for profit. As each load arrives at the factory it is sampled and the sample tested for the percentage of sugar; a minimum per cent. has been fixed and none will be received below it; the price paid is altogether dependent upon the rate of sugar shown, and thus far the plan appears to be satisfactory to all concerned. It is yet too soon to form an idea of the profit of either the investment in plant and machinery or in growing the crop. The company have undoubtedly started upon the proper basis, that of paying in exact proportion to the amount of sugar shown; this will have much to do with the attempt to grow large crops regardless of the amount of sugar; this has been the rock upon which nearly all of our eastern factories have struck, and which has proven fatal to the industry; it is one thing to obtain a large crop by weight of roots and quite another thing to grow a crop rich in sugar; almost any land, if well manured, will produce a luxuriant and heavy crop of beets, but such beets will usually not show the desired percentage of sugar, or if they do show it, the percentage of impurities is so large the difficulties of separation and crystalization so great, that the attempt has thus far always ended in financial failure.

The history of the attempt at Grand Island is thus described by a friend of the enterprise:

"After three years of extensive, careful and expensive experiments in growing sugar beets, under the directions of an expert German chemist who had made the subject his life study, it was demonstrated beyond a doubt that the altitude, bright, dry atmosphere and peculiar soil in the immediate vicinity of Grand Island, were conditions extremely favor-

able to the successful cultivation of the sugar beet. Efforts made for years and continued without success, were now renewed with redoubled energy to induce capital to invest in the manufacture of beet sugar at this place. The attention of Mr. H. T. Oxnard, a sugar refiner of large experience, backed with unlimited capital, was at last attracted. Mr. Oxnard had been investigating the beet sugar industry for years and had already visited and re-visited every country on the globe where the conditions for growing sugar beets were supposed to be favorable. Negotiations with him were at once begun, looking to the erection of a factory which would be not only one of the largest, but the most complete and perfect establishment in the world for making sugar from beets. Ground for the erection of this immense plant was broken in December, 1889, and the work was pushed as fast as men and money could do it—from two hundred to four hundred men having been directly employed since that time.

"The machinery (excepting only the boilers and numerous vats and tanks of steel) was purchased in France and Germany and erected under the personal supervision of a number of experts from those countries. Some idea of the magnitude of this factory can be formed when it is known that one hundred and thirty-six car loads of machinery, or three trains of forty-five loaded cars each, have been received and put in place in the main building. Employment is furnished directly and indirectly to more than one thousand persons during the campaign, and the product of three thousand acres of beets has been found inadequate to supply the demands of the factory. Six car loads of coal and limestone are consumed daily."

If we are to take European manufactories of beet sugar as a guide, the profit or loss largely depends upon the utilization of the refuse pulp after the sugar has been extracted, if this is used as stock food and all utilized it may decide the question between profit and loss. European factories have not our cheap corn to contend with in feeding cattle (to which use the pulp is usually put), and, while its use for this purpose may prove profitable there, it may be unprofitable here, because corn is a more economical food ration.

The capacity of the Grand Island factory is fixed at two thousand tons of beets per day, and it is stated upon good authority that the beets brought to the factory by Nebraska farmers show an unusually high rate of sugar. If this sugar is unaccompanied by the large percentage of impurities the investment may prove profitable, and as such prove an exception to all others projected this side of the mountains.

In California two factories are in operation, and one of them is said to be fairly successful, from a financial point of view, but the producers are not satisfied with the price paid, and, therefore, the supply is not regular or certain. The other factory, while not so successful, has thus far shown a better percentage of sugar, but the crops being smaller in yield are not any more satisfactory to the producers.

The manufacture of sugar from sorghum has not made much advance during the past year. The large factory at Topeka, Kansas, which was burned down, has been rebuilt, and the one at Attica, Kansas, has given up the manufacture of sugar and is devoted exclusively to the manufacture of syrup.

In most portions of the cane districts surrounding these manufactories the crop has been very short, and in some cases did not exceed four and one-half tons per acre, but it is claimed that, as with sugar beets, a short

crop is proportionately richer in sugar, the result may not prove disastrous to the capital invested.

Some advance has been made in the direction of improving the cane by a careful selection of seeds from canes showing the greatest percentage of sugar, and at Sterling, Kansas, the Department of Agriculture has been experimenting in this direction for three or more years. It is claimed that the result clearly shows that much advance may be made in this direction alone, and that not only some varieties of cane produce more sugar upon certain soils, but that single individual canes of the same variety and on the same soil show different sugar producing capacities. It is by taking advantage of this that the experimentors hope to increase the percentage of sugar, and it is owing to their having taken advantage of them that they have made the advances claimed.

Enough has been shown that profit in either beet or sorghum sugar cannot be attained by growing immense crops of any kinds of cane or roots upon any kind of soil, and that the careful selection of both soil and cane and beet seed may turn loss into profit.

The Wheat Aphis.*

(*Siphonophora avenæ*, Fabr.)

The appearance of this insect in large numbers and in so many different portions of the state during the past season, led many to suppose that it was a new enemy of the wheat plant and numerous surmises were made as to the probable result to future crops. Entomological observation however soon proved that it was an old and well-known insect, which, owing to the combination of causes, had suddenly become unusually numerous. This increase in numbers was accounted for by the following reasons:

1. The unusually mild winter had been less destructive to the eggs upon which the propagation of the succeeding year's crop of insects depended; if double the usual number of eggs came safely through the winter, it is fair to assume that double the usual number of insects would be noted.

2. The mild fall may have given an opportunity for an additional crop or generation of the insects and this may have greatly increased the number of eggs laid late in the fall, for the production of the insects of the next year.

3. All insects of this class are naturally held in check by parasitic enemies which prevent them from becoming dangerously numerous; circumstances may have been such that the parasitic enemies of the wheat aphid were less numerous than usual and that on this account they increased to an unusual number; any one of these causes would be sufficient to account for the increase and all of them combined would account for a very much greater increase than was noted.

Prof. Smith thus explains the manner in which this class of insects (plant lice) are propagated.

"We find these lice an excellent illustration of what is known as parthenogenesis or reproduction by virgins. Unlike most other insects

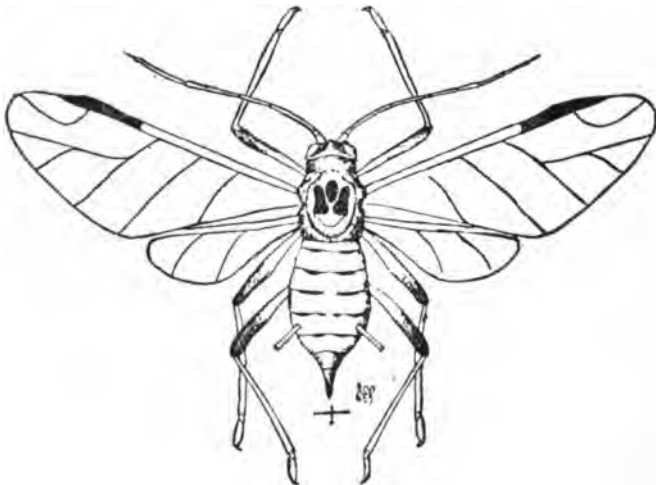
*The writer would hereby acknowledge his indebtedness to Prof. John B. Smith, of the New Jersey Agricultural College Experiment Station, for a portion of the information herein given, and the seventy-second bulletin of that station for the illustrations used. Our readers who desire to follow the subject further are referred to the above bulletin and to the annual report of the National Department of Agriculture for the year 1889.

the young are usually born alive and ready for work and there is no time during their life that they do not feed constantly.

In the spring, the lice, usually few in number and winged, make their appearance on the plants. These start by giving birth to young lice, which at once begin feeding and in a few days begin in turn to bear young, much more rapidly indeed than the parent or winged form. The latter has been observed to give birth to two in a single night, while one of its own progeny, without wings, gave birth to four living lice during the same period. These wingless lice are all females, and no males at all are produced. Their progeny are like themselves, and it is nothing unusual to see hundreds of lice grouped round a single stem-mother. In some species a few forms are constantly becoming winged, and these disperse and found new colonies. So the thing goes throughout the summer, in some species, until at the approach of cold weather perfect or sexed individuals are produced. These copulate in the usual way, and eggs are produced which survive the winter, producing next season the stem-mother of a new colony. Sometimes the history is less simple. Occasionally the host plant does not last all summer, or will not support the vast swarms. Then they may migrate to some entirely different plant, not returning until late in fall or perhaps not until the following spring."

Some species make their way under the ground at certain seasons of the year and infest the roots of the plants they feed upon at other seasons. The peach and wheat aphids are examples of that. Of some we have never been able to find the sexes. The wheat aphid has thus far baffled all our investigations and we do not know any male of the species. Nor do we know where it passes the time between the harvest and the appearance of the winter wheat.

Prof. Smith furnishes the following description of the wheat aphid:



Wheat louse; winged viviparous female. (Magnified).

'In color it is green, varying shade, and with a row of egg-shaped black spots on each side of the thorax, and with a row of blackish dots

on each side of the abdomen. The antennæ are about as long as the body, the legs with pale greenish thighs, and with dull ochre, black-tipped shanks.

"The wingless forms have much the same shape as in the case of the others, but more uniformly grass green in color. The very young lice are proportionately more elongate and somewhat deeper green in color.

"At the side of the abdomen, near the tip, are the honey tubes, two moderately long organs from which many of the plant lice excrete a sweetish liquid of which the ants are very fond. This accounts for the fact that ants are so often seen on plants frequented by lice, and these latter are never on any account injured by the ants, but are protected and carefully tended by them.

"The antennæ, or feelers, have in the winged form a series of pits or sense organs at the lower half of the first long joint. On the third long joint is a little aggregation of pits near the tip, and on the enlarged basal portion of the last, or whip joint, is another series of pits. In the wingless forms these pits are present only in the last or whip joint. The antennæ are further curious and interesting from being densely covered with scale-like markings. These pits are sense organs of some kind, and most likely connected with the sense of smell. They may be

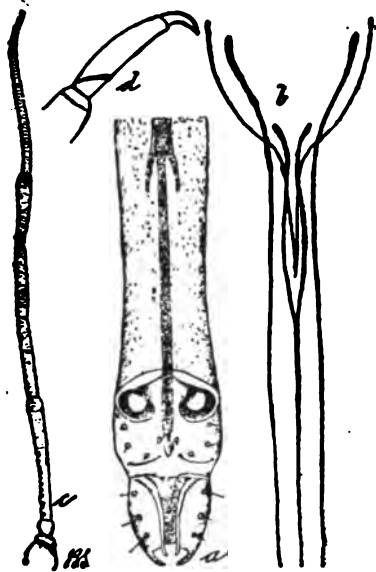
of use to enable the insects to identify their food plants on their migrations, and for this the winged forms only, need the organs.

"It has been already stated that the injury to the plants is done by piercing the leaf or stem, and sucking the juice. By turning a louse bottom up, the beak can be seen starting from the underside of the head and extending backward between the forelegs. The beak is three-jointed and is shown, Figure 2, *a*, in a front view. It will be seen that it is not a solid tube, and that there are three joints. The one nearest the body is much the longest, and strengthened by a chitinous rod through the center. The middle joint is short, with a curious flap on each side and several tactile hairs. The terminal joint at tip is furnished with minute saw teeth and sharp projecting edges, perhaps to enable the insect to keep a better hold.

"Within this tip are three fine hair-like lancets, of which the lower is really composed of two, grown together, and

these are the true piercing organs. Of course these are very delicate structures and apparently not very strong, but they are sharper than the finest needle and can pierce the plant structure with little or no effort."

In the life history of this insect that portion which elapses between the time that the crop is harvested and the next crop has sprouted through the ground, is a blank; where it spends the time or in what form, is not known, but, reasoning from analogy, it is inferred that it takes up



a. Proboscis of wheat louse; *b*. The lancets contained in it; *c*. Antenna, showing the sensory pits; *d*. Tarsus.

with some other hosts, and that it preys upon some other plant or class of plants.

The experiments and examinations of Prof. C. V. Riley, gave him such results as appear to have warranted him in stating that "these observations prove, however unsuccessful breeding cage experiments may have been, that the species bridges over the gap between wheat harvest and the appearance of the fall wheat by migrating to the midsummer grasses." Prof. Riley also writes "from the foregoing summary of what has been observed, and from analogy in the known life habits of allied species, we may conclude that the winter-egg is laid upon the winter wheat, and that, although individuals may live until late in winter, it is this winter-egg state on the wheat that the species normally hibernates and from which the stem-mother hatches in spring to give rise to the prolific wingless generations of late spring and early summer."

A New Enemy to Wheat.

In a recent bulletin issued by the experiment station connected with Cornell University, Prof. J. H. Comstock, illustrates and describes, under the name of "A saw-fly borer in wheat" (*Cephus pygmaeus*), a new enemy to the wheat plant, which appears to have been discovered on the station farm about two years ago, by S. H. Crossman, and since carefully studied by Prof. Comstock.

Though for the first time noted in this country, this member of the saw-fly family is well known in Europe, and especially in England and France, where it annually does no little damage to the crop. A somewhat noted French writer, in alluding to its destruction, writes as follows:

"If you traverse a field of wheat or rye a week or a fortnight before harvest you may observe a greater or less considerable number of the stems the

contrast with the neighboring plants which are still very green; and the and appear to have attained their perfect maturity. They form a striking straight and whitened ears of which elevate themselves above the others, heavy ears filled with grains are inflexed and bent towards the earth whilst the others are entirely empty, or contain only a very small number of grains, which are for the most part shrunk and horny."

In comparing the European accounts of the ravages of this insect with his own observations at the college station, Prof. Comstock writes as follows:

I found the same lodging of the wheat caused by the circular cut near the root; but this lodging of the grain appears to be the chief injury here. I did not find that the presence of a larva in a stalk caused the complete destruction of the seed described by European writers. In fact, in most cases, the grain shelled from a certain number of infested heads weighed more than the



a. Female beginning to oviposit; b. Female ovipositor inserted in straw.

grain shelled from the same number of non-infested heads taken from the same bundle in regular order after the infested ones had been removed. This was at first very puzzling. It seemed to point to the absurd conclusion that the presence of this borer within a stalk increased the amount of grain produced by that stalk. It was noted, however, that the infested stalks were almost invariably large, healthy ones, with good, well-filled heads. When we recall the fact that the laying of the eggs takes place while the wheat is still small, and that a stalk must be large enough to contain a hollow of considerable size before it is suitable for the development of a larva, it will be seen that the stalks infested will naturally be those that are the largest early in the season; while the stalks that are backward in their development, and consequently will produce smaller heads, will escape the attack of the insect. Therefore, a comparison of heads from infested stalks with heads from stalks of average size will not indicate the results of the presence of the insect. Still, as I have already said, it appears that with us the chief injury caused by the insect is the lodging of the grain. Some observations were made to determine how abundant this insect is at Ithaca. It was found that the proportion of straws infested varied from .7 of one per cent. to 11 per cent., with an average of 4.6 per cent."

In referring to the work of the insect as observed at the station, and to its manner of effecting its changes, Prof. Comstock writes as follows:



Straws cut by larva.

"It is of a shining black color, banded and spotted with yellow. The male measures one-third inch (8mm.) in length; the female two-fifths inch (10 mm.) Soon after the adults emerge from the stubble, they pair and the females begin to oviposit. Thus in our breeding-cages, the adults which emerged from the 8th to the 10th of May, began to pair on the 10th and the females were ovipositing on the 13th. The appearance of the insects in large

numbers in the field took place four or five days before the heads of wheat began to appear, i. e., before they began to project from the sheath formed by the upper leaf. But it was not until the latter date that the flies had migrated to the wheat fields in considerable numbers. It will be noted that as the insect winters in the stubble of wheat, and that as in this region one crop of wheat rarely follows another, it is necessary for the adults, when they emerge, to migrate a greater or less distance in search of a wheat field, in which to oviposit. We found that the female migrated to the wheat fields first; but they were soon followed by the males. The specimens which I reared in breeding-cages in which wheat was growing laid their eggs at various distances from the ground. Many observations, both in the Insectary and in the field, convinced me that these insects oviposit anywhere along the larger part of the straw where it is hollow; but chiefly in the upper portion. In each case that I observed, the female stood with her head towards the ground. The making of the slit through the straw, and the laying of the egg occupy about one minute of time. The slit made by the insect's ovipositor is so small that it can be detected only with difficulty. By carefully marking the point on a straw, at which a female was seen to oviposit, and then examining this point with a microscope, I was enabled to find the

puncture. It is about one one-hundredth inch ($\frac{1}{100}$ mm.) in length, slightly enlarged at the upper end. The egg is pushed entirely through the wall of the straw and is left adhering loosely to the inside. It is of a milky white color, one twenty-fifth inch ($\frac{1}{25}$ mm.) in length, and one seventy-fifth inch ($\frac{1}{75}$ mm.) in width at its widest place. It is oblong, and slightly curved. In our breeding-cages the females laid many eggs in the same stalk. This was to be expected, owing to the large number of insects confined with a small amount of grain; but I was surprised to frequently observe a female lay an egg and then move down the same stalk two or three inches and repeat the operation without an effort to seek a fresh stalk. Although many eggs were laid in some of the stalks in our breeding-cages, in no instance did more than one larva become fully grown; and no trace of the other larva could be found. I have found in the fields stalks containing two larvæ, but these larvæ were separated by a joint of the straw. In no instance, after all the joints of



Larva in cell at base of straw.

a straw have been tunnelled, have I found more than a single larva. It is probable that where more than one egg is laid in a stalk, the stronger larva destroys the others. The eggs hatch soon after they are laid, and the larvæ may develop quite rapidly. A larva which hatched from an egg laid May 13 was on May 24 about one-quarter inch (6 mm.) in length, and had bored through the principal joint of the straw, and had also penetrated the upper solid part of the stalk. Four days later another larva, which also hatched from an egg laid May 13, was found to have tunnelled the entire length of the stalk in which it was. In no case did I find any external indications of the presence of a larva in a wheat stalk until the larva was nearly full grown, and had tunnelled the stock down to the first joint. At this time there is frequently a discoloration of the stalks just below the injured joints. This was observed during the first week in July. The wheat had then reached its full height and the grain was in the milk. At this time there was observed scattered through the field heads of wheat which were yellow and contained no grain. These dead heads corresponded in appearance exactly with those described by Herpin. I carefully examined many of these stalks, and found that in no case was the injury due to *Cephus dygmaeus*."

Spraying Fruit Trees.

The reader who has attentively followed the agricultural press will be ready to conclude from the evidence which he obtained that spraying fruit trees as a remedy for insect foes is a failure, and that on the whole it has done more injury than good, and yet this conclusion, while it appears to be warranted by the evidence, would be far from correct. A careful examination of the failures which have been recorded will show that they may be traced to one or more of the following errors:

1. The work was done too late and not until after the injury had been done by the insect.
2. The insecticide used was made too strong and damaged the foliage to extent more than equivalent to any benefit gained in other directions.
3. In trees having delicate leaves the spraying was done while the sun was shining hot and warm.

That much benefit may be gained by spraying as a remedy for the

codling moth is beyond doubt, but to be efficacious it must be done before the egg is laid in the minute fruit; for apples the insecticide should be applied as soon as the blossoms have fallen and while the little fruit cup is still turned upward to receive and hold the poisonous fluid. If performed ten days too soon or too late the whole benefit is lost and the experiment pronounced a failure.

Recent experiments indicate that the proportion of poisonous material used must be varied in amount according to the condition of the foliage, character of the tree, nature of the insect life to be attacked and to the nature of the fungi in disease feared. For apples, just after the blossoms have fallen, London purple or Paris green may be used in the proportion of one ounce of the mineral to twelve pounds of water, in some cases one-half of this amount has been pronounced as efficacious as the full amount and is much more safe, for the plum curculio. As soon as the blossoms have fallen, the same material may be used in the same amount, but the application should be repeated every four or five days as the blossoms fall much more unevenly than those of the apple; spraying peach trees is at best a dangerous experiment and the losses which have ensued from the practice probably overbalance the benefits. At the Michigan Experiment Station it was found that the trees were injured by spraying with a mixture composed of one pound of London purple in two hundred and fifty-six gallons of water, it was found that the young shoots suffered less than leaves of older growth and it was supposed that this was due to the fact that the younger shoots and leaves were covered with a gummy material which protected them from the action of the poison.

In another experiment large peach trees were sprayed (June 2) with two mixtures, one consisting of one pound of Paris green in 256 gallons of water and the other of one pound of London purple in 20 gallons of water; in both cases the trees lost their foliage almost entirely and never fully recovered from the injury thus done. In another case a mixture of but one pound of London purple to 496 gallons of water inflicted more or less injury.

In experiments in spraying plums at the Ohio Experiment Station it was found that ordinary varieties were safe with a mixture composed of one pound to 12 gallons of water but that all of the wild goose varieties were injured by a mixture of even one-half that strength.

While London purple and Paris green appear to have had the best success and the greater number of admirers, we find that others have preferred the Bordeaux mixture and ammoniacal carbonate of copper; the former is composed of the following ingredients and may be compounded by anyone:

Sulphate of copper ("blue stone"),	12 pounds.
Quicklime (fresh),	8 pounds.
Water,	22 gallons.

The "blue stone" should be pulverized and dissolved in three or four gallons of water; the quicklime should be first dissolved in five or six gallons of water and both then added to the remainder of the water and well stirred; if both are pulverized before dissolving it will facilitate the operation.

Ammoniacal carbonate of copper is composed of the following ingredients:

Carbonate of copper,	6 ounces.
Commercial ammonia (22 degrees strength),	2 quarts.
Water,	22 gallons.

The ammonia and carbonate of copper may be added to sufficient water to dissolve the latter and then mixed with the remaining water.

The horticulturist of the Wisconsin Experiment Station reports excellent results with the latter solution as a preventive for apple scab. The result of the use of the carbonate of copper solution, for the special purpose of preventing scab, were so beneficial that this year the whole orchard of twenty-five acres was sprayed.

For the results of spraying the reader is referred to Bulletin No. 23 of the Wisconsin Experiment Station, Bulletin XVII of the Cornell Experiment Station, Vol. III, No. 4 of the Ohio Station, and Bulletin No. 102 of the Connecticut Station.

Those interested in the different kinds of spraying and force pumps are referred to Bulletin of the Ohio Station. Those interested in the application of general or special insecticides are referred to the annual report of our Board for the year 1886, pages 164 to 169.

Loss to Barn-yard Manure by Fermentation and Leaching.

It has been stated by chemists, and the statement supported by good and practical authorities, that barn-yard manure loses under ordinary and favorable circumstances, twenty per cent of its value between the *stable* and the field to which it is applied. If this is true of barn-yard manure under favorable circumstances, what must be the loss under the unfavorable circumstances to which many subject it? It is evident that a reliable answer to this question is out of the question, and that any attempt at an answer must result in an unsatisfactory estimate. But by the aid of our experiment stations, we may be able to measure very closely the loss under reasonably favorable circumstances, and the experiments of at least two of our stations have been directed towards this result.

The station connected with Cornell University, in one of its bulletins (No. XIII) reports that it was found that the horse stable, when subjected to careful weighings for one day (Sunday when the horses were in the stables all day) showed the following results:

Total weight of manure and bedding,	529.5 pounds.
Weight of bedding used,	38.5 "
Total weight of excrement, solid and liquid,	491 "
Average excrement per horse per day,	54.5 "

This manure was placed in a wooden box (not water tight) and placed in a pile with exactly similar manure, made under exactly the same circumstances and allowed to remain there undisturbed for six months.

At the end of the six months a careful account was again kept for one day (Sunday as before) of all the bedding, etc., of the same stable, and the following was found to be the result:

Total weight of manure and bedding,	496 pounds.
Weight of bedding,	30 "
Total weight of excrement, liquid and solid,	466 "
Average excreted per horse per day,	58.25 "

In both cases the feed, care and surroundings were the same, and it is reasonable to suppose that when both were fresh the two lots of manure were as nearly as possible the same in composition.

Careful chemical analysis, however, showed the following variation in them:

ANALYSES.

	Fresh horse manure.	Horse manure after six months exposure as above.
Water,	70.79 per cent.	81.74 per cent.
Nitrogen,	0.51 " "	0.46 " "
Phosphoric acid,	0.21 " "	0.15 " "
Potash,	0.53 " "	0.31 " "
Total weight of manure,	529.5 pounds.	372 pounds.

The experiment having been very carefully conducted, it is but fair to assume that these two analyses fairly represent the composition of the two piles of manure, and that their difference will represent the loss by fermentation, etc. If then we apply to these analyses the same valuations which we apply to commercial fertilizers we obtain the following results and values per ton:

Fresh horse manures:

Nitrogen,	0.51%	10.2 lbs. @ 17	\$1.78
Phosphus acid,	0.21%	4.2 lbs. @ 07	.29
Potash,	0.53%	10.7 lbs. @ 04	.43
			<u>\$2.45</u>

Horse manure after six months exposure.

Nitrogen,	0.46%	6.5 lbs. @ 17	\$1.10
Phosphus acid,	0.15%	2.1 lbs. @ 07	.15
Potash,	0.31%	4.4 lbs. @ 04	.17
			<u>\$1.42</u>

With this experiment and these analyses as a basis we may assume that fresh horse manure exposed to fermentation for six months would lose 29.74 per cent of its weight and that 2,000 pounds fresh would weigh but 1,404.2 pounds after six months; also that if one ton of fresh horse manure was (when fresh) worth \$2.45 per ton, it would be worth but \$1.42 after the lapse of six months. This, if accepted as correct, would indicate a loss of 42 per cent.

It should be remembered that the changes indicated were due to three causes, viz: less in weight, gain in weight by absorption of water, and loss of fertilizing value.

At the New York Agricultural Station at Geneva a similar experiment was tried in a somewhat different manner.

One-half cord of manure was carefully taken from a large pile, sampled, analyzed and put into a round high heap January 4, at the same time another half cord of manure which had been mixed with muck, was treated in the same way, both piles were treated in the same way, the object being to ascertain the different ratios of loss in the manure and the compost; weighing at different times gave the following results:

	Manure.	Compost.
January 4, 1889,	3,298 pounds.	2,376 pounds.
April 13, 1889,	1,148 do.	2,130 do.
January 21, 1890,	1,148 do.	1,810 do.

These figures would indicate that the manure lost 65.19 per cent. of its weight and the compost 28.6 per cent; or, as found at the station, the manure lost 50 per cent. of its bulk and the compost 28.6 per cent.

The result of the analysis of the fresh stable manure, and that of the same quality over one year old, was as follows:

<i>Fresh manure.</i>			
Nitrogen,	10.06 pounds	@17,	\$1.71
Phosphoric acid,	0.67 do.	@09,	0.47
Potash,	20.94 do.	@04,	0.838
			<u>\$3.018</u>
<i>Old manure.</i>			
Nitrogen,	5.884 pounds	@17,	\$1.00
Phosphoric acid,	0.80 "	@07,	0.056
Potash,	8.227 "	@04,	0.329
			<u>\$1.385</u>

If we assume this result to be correct, we prove that after over one year's treatment as above described, the manure had lost in value just \$1.63 per ton; or a loss of 54 per cent. of actual fertilizing value.

The report of the experiment calls attention to the fact that the season of 1889 was unusually wet and damp, and we may therefore assume that this experiment represents an extreme case.

Taking the result of these two experiments as our guide, we arrive at the conclusion that barn-yard or stable manure loses fully 50 per cent. of its fertilizing value by the treatment given it in the experiments.

For the purpose of ascertaining the loss to manure by leaching, the experiment was carried still further at the Cornell Experiment Station. The manure from all of the stables was always carefully spread over the well-covered yard and trodden down solidly by the stock; a galvanized box, two feet square and one foot deep, with a well perforated bottom, was filled by a block of manure from under the shed, of its exact size, and the box exposed to the rain and weather for six months, the drippings being carefully collected and taken care of; at the beginning of the experiment the block of manure weighed 226 pounds, and at the end of the test its weight was but 222 pounds, any discrepancy between the loss and the weight of the leachings being made up by rainwater absorbed.

A careful analysis of the contents of the box, the leachings and a corresponding block of manure from under the shed, indicated the following results:

	In manure in pounds.	In leachings in pounds.	Loss per cent.
Nitrogen,	1.0101	0.0337	3.2%
Phosphoric acid,	0.5839	0.0293	4.7%
Potash,	0.7992	0.4369	5.0%

Reducing these to a valuation at the same rate as commercial fertilizers we have the following result:

	In manure.	In leachings.
Nitrogen @ 17,	\$1.52	\$0.05
Phosphoric acid @ 07,	0.36	0.02
Potash @ 04,	0.28	0.15
	<u>\$2.16</u>	<u>\$0.22</u>

From this Prof. Roberts infers that the manure loses 9.2 per cent. by leaching alone.

At the Cornell Station two samples of exactly similar nature were treated in the following manner; one was spread out thin in metal pans, so that no liquid could escape and exposed to the sun during dry weather but no rain was allowed to fall on them; as a result the manure dried slowly without any fermentation and so far as the one experiment went, without any "appreciable loss of fertilizing constituents" but the station did not feel warranted in publishing the exact result of analysis, for fear of error.

The report of the station thus sums up the result of the connected experiment:

"The result of one season's trial seem to show that horse manure thrown in a loose pile and subjected to the action of the elements, will lose nearly one-half of its fertilizing constituents in the course of six months; that mixed horse and cow manure in a compact mass and so placed that all water falling on it runs through and off, is subjected to considerable, though not so great a loss; and that no appreciable loss takes place when manure simply dries."

Contagious Diseases of Domestic Animals.

During the past year the owners of live stock in our state have suffered much less than their usual loss from contagious diseases; we have had but few outbreaks of Texan fever, and the few which occurred did not result in serious loss; the weather of August and September was not favorable to the production and spread of anthrax fevers, and less than usual loss was experienced from this prolific source during 1889.

An outbreak of hog-cholera among the hogs at a large distillery near Brownsville, was, probably, the cause of the greatest loss to one individual owner; the facts of the case were not reported until after the hogs had been shipped, some of them to points outside the state, and when the state officer came in possession of the case the pens had been cleaned out and partially disinfected. The owners, being well aware of the contagious nature of the disease, gave assurance that for the present at least, cattle would be substituted for hogs, and any danger of future outbreaks thus averted.

The act of May 9, 1889 gives the Secretary of the Board of Agriculture full power to deal with all contagious disease, and the only drawback to satisfactory action is the small amount (\$500.00) appropriated for the purpose; when we take into consideration that this duty covers not less than \$90,000,000 worth of live stock, the reason for limited action becomes apparent.

Under the circumstances it was not deemed advisable to expend the appropriation by extending it over so much surface and material that its effect could not be noted. It was decided that it would be useless to attack any contagious disease but glanders in horses, and this line of action has been persevered in throughout the whole year.

Under the provisions of this act twenty-seven glandered horses and mules have been killed; in all cases the owner was satisfied before the animal was condemned by the state officers, and proper papers signed and filed, showing the willingness of the owner to have the animal killed. The price paid by the state officers for these animals was \$245.00, or at the rate of \$9.42 per head; some were not appraised at all, the owners being perfectly willing to have them killed. For the

animals actually paid for the average price was \$12.25, which was paid by the check of the secretary of the Board.

It is difficult to estimate the loss prevented by this action; in several cases the animals were in such a condition that the local surgeons disagreed as to the exact character of the disease; this placed upon the state surgeon the difficult task of deciding a case with which he was not familiar. In all cases of sufficient doubt a post-mortem was made and in no case was any error shown.

Our investigation for the past fourteen years, made with other objects in view, clearly show that tuberculosis prevails to a much greater extent than is known to the casual observer of such affairs. As this disease is propagated and spread by hereditary taint as well as by direct contagion it is not surprising that its spread should be quite rapid; in fact it is a matter of surprise to those who are well acquainted with its nature that its presence has not been more plainly shown. Thus far it has largely been confined to cows and breeding stock, and its existence is seldom noted among western animals. The purchase and removal of thoroughbred and grade animals to the west must sooner or later show its effect in the stock shipped east for our fat cattle markets and in the stock cattle shipped east to be fattened at Lancaster and other eastern counties.

As cases of tuberculosis require considerable time for their full development they are seldom met with in fat cattle which are usually killed within six or eight months of the time they reach our eastern cattle feeders; a few cases have been met with but they are usually to be found in grade animals from stock shipped from the east for breeding purposes only.

No cases of contagious pleuro-pneumonia have been known in the state during the year, and it is believed that the care now being used by the National Department of Agriculture to prevent it being brought to us from other states will enable us to continue to make a similar report. Several cases have been reported by local surgeons but in every case it was found either to be tuberculosis or ordinary pleuro-pneumonia.

There have been comparatively few outbreaks of hog-cholera and those which did occur (with the exception noted above) were usually so late in the season that but little loss was experienced. The work of the national and state officers at Chicago and other stock centers has undoubtedly had an effect in checking the spread of contagious diseases and the precautions now taken with southern stock, possibly infected with Texan fever, has undoubtedly saved the Pennsylvania stock grower and feeder many thousands of dollars and saved the state officers much of the work which has fallen to their lot in former years.

Inoculation as Preventive of Texan Fever.

Paul Paquin, the energetic veterinarian of the Missouri Agricultural College Experiment Station, has given us the results of his experiments with inoculation as a preventive of Texan fever, and in connection therewith gives what he believes to be a solution of the mysterious manner in which the Texan and southern animals may be free from all appearance and effect of the disease and yet infect and destroy all northern animals which may come on contact either with them or with their excreta in any form.

As a result of Mr. Paquin's experiments, which were of that practical

nature which will carry conviction with their results, we may obtain the following summary of results and conclusions:

1. That Texan fever germs may be found in some of the surface soils, grasses, and pond waters of the infected districts in the southern states.

2. The virus is found in the liver, spleen, lymph, glands, kidneys, bile, urine, fœces, and is transferred to the north chiefly by the urine and manure.

3. The ticks and feet of the cattle are capable of carrying the germs to distant points.

4. The period of incubation, *i.e.*, the lapse of time between the moment that germs are taken in the body by susceptible cattle and the appearance of the disease, is between eight and twelve days only. Cattle may be exposed longer and not become affected, but this depends on the weakness of the germs in conditions demonstrated by the field test and inoculations.

5. So far, experiments indicate that about thirty days after leaving the southern infected soil, the southern cattle are not dangerous; consequently if they are kept in quarantine north of the fever line, they could then be safely scattered among northern stock. More experiments are necessary on this point.

6. The cheapest mode that we know to disinfect cars and yards is by quicklime, corrosive sublimate solution, or steam; but more experiments are needed. Chloride of lime has little value except to impart a pleasanter odor.

7. The means to disinfect southern cattle alive and render them harmless before shipping north is not settled and more experiments are needed to establish it conclusively.

8. Inoculation was not at first successful, but afterwards proved beneficial. Properly inoculated cattle were shipped and exposed south with little or no damage. More experiments are needed here also.

9. Other animals than cattle may, under certain conditions, when shipped by rapid transit, bring Texas fever north, and one good observation indicates that a shipment of horses has done so in the state of Missouri.

10. During favorable weather virus spread in the north with fresh manure and urine directly from southern cattle, becomes virulent in about thirty days, and perhaps occasionally less during the warm month and remains virulent until decidedly cold weather.

11. Under the circumstances explained in the bulletin, northern cattle suffering from Texan fever may communicate the disease to other northern natives, though this cannot occur in the ordinary course of things in Missouri or any where north, because cold weather arrives too soon to allow the vegetation of the germ to virulent maturity.

12. Calves born south become inoculated or receive the germs of Texan fever directly from their mothers before birth, and then continue to resist the germs first because of this natural inoculation, and second because of receiving the virus gradually, perhaps in the milk, and then they begin to nibble grass.

From the experiments and results of Mr. Paquin we may draw the following deductions:

1. That unprotected northern animals taken to southern infected pastures will die in twelve days, especially if the weather is warm; but that it takes twice as long for our native northern stock to die when the germs are brought to our pastures by southern cattle and dropped with manure and urine. The reasons for this is supposed to be found in the

fact that on southern soils and in southern climates the germs find that regular and constant warmth necessary to their rapid multiplication.

2. That the germs after passing through the animals are not ready to cause disease but that they require sometime before they take on their virulent form and consequently germs spread in the usual way on our northern pastures must have time to accumulate their virulence unless they were brought there in the voidings of infected southern cattle, in old manure or urine adhering to their feet.

3. That but for our cold weather and frosts our infected native cattle could and would convey the disease to other natives; and that the northern danger line of the disease is marked by a temperature low enough to prevent the proper multiplication of the disease germs.

4. That one single inoculation, mild or powerful, is not sufficient protection against Texan fever, and that the virus must be of a certain power and prepared purposely with the greatest care and by scientific methods.

5. That inoculation with too strong virus, causing high fever or positive signs of Texan fever is not a sure protection, but instead it is a dangerous practice and may kill the stock directly, or cause such damage in the system, that when exposed to the virus when thus suffering or soon thereafter, the subjects gradually get worse and die, never having regained their strength.

6. That inoculations beginning with the mild virus and ending with stronger, is more rational, as being more like the natural process of inoculation of southern calves, and is in a large degree a protection against Texan fever.

7. That possibly the safest method of inoculation is to complete it on the southern cattle after shipment, providing that there be no exposure to the germs during the period of inoculation, particularly at the beginning.

Lump Jaw In Cattle.

(*Actinomycośis bovis.*)

"Lump jaw," "big jaw" or "lumpy jaw" in cattle has been well known to our cattle feeders for years; the writer has repeatedly seen cases in the drove yards of Philadelphia and Pittsburgh and has also noted them among the farmers of Chester, Lancaster and Delaware counties when cattle were much more extensively fed than now. It was supposed to be the result of bruises and rough treatment received in the cars and although the animal invariably lost flesh and finally died, it was not then recognized as a distinct disease.

Recent investigation proves conclusively that it is not only a contagious disease, and the only question in relation to it which now influences the veterinarian is as to the exact manner of its transmission.

It is admitted that the disease is caused by a species of fungoid growth which finds its entrance into the system of the animal through bruises or wounds, and having thus found entrance multiplies rapidly and causes the derangements of the system which result in death.

Dr. Detmers writes thus of the growth which is the cause of this disease: "The fungi known as as actinomyces present themselves arranged in nests, which appear to the naked eye as tiny yellowish specks, but under the microscope show a plain radiation from the center to circumference and a more or less regular roundish or oval form. These nests invariably contain quite a number of small round bodies

which look like micrococci, and by some investigators are taken to be micrococci, while others regard them as spores. These nests, and their rosette-shaped form, can be distinguished under comparatively low power, but the details require, to be seen, a power of about five hundred diameters."

In referring to this disease, Dr. James Law, of Cornell University, under date of July 11, 1890, writes us as follows:

"Now as to my own view of the cause of actinomycosis, I must qualify my remarks by excluding all other tumors of the gums, tongue, jawbones, cheeks, face, throat, neck, lungs, liver, skin and muscles, and restricting them to those swellings only, in which the actinomyces (ray-fungus) is found.

In these last cases, the vegetable (fungus) growth is *the cause* of the development, extension and propagation of the tumor, and of its appearance in the form of secondary deposits and growth on distant organs. As has been abundantly proved by inoculation (implantation) experiments, the disease can be transferred by transferring the cells of the fungus from one organ of the animal to another, and from one animal to another. That it is usually introduced in the food is manifest in the fact, that its most common seat is about the mouth and throat. That its germs are carried in the blood and other circulating fluid, is manifest from its frequent development in the liver, which it must have reached from the stomach or intestines through the portal vein. And yet we are told that the carcasses of animals affected by this parasitic tumor may be safely eaten and should not be withheld from the general market for dressed beef, pork and mutton! It is the old argument that all who are exposed to infection don't contract a disease, therefore, no measures are warranted for the protection of the few who would contract the malady. This argument would promptly stop all sanitary work.

But, it will be alleged—*the diseased head should be destroyed, only the carcass should be used for food*. I ask in return who can assure us that minute secondary deposits of the vegetable, have not been started in the carcass? I venture to affirm that a microscopic examination of the carcass that would exclude all risk of actinomycosis, would require weeks of assiduous work, and would leave the specimen unmarketable. The detection of the fungus is not always an easy task, and it is folly to base the public sanitation on the microscopic examination of a carcass, in a portion of which the actinomyces have unquestionably secured a hold.

In taking this position, I do not ignore that the disease does not spread from animal to animal with the rapidity of many bacteridian affections, yet I can no more forget that the disease when it does occur, is due to the implanting of the parasite and I consider that the sanitarian is called upon to take precautions against the lesser probability as well as the greater. As evidence of its natural propagation under favoring circumstances, I have seen it appear in three successive generations—grandmother, mother and daughter—all indeed that lived in the same pasture and stable, and in another case, seventeen animals in three adjoining herds suffered at the same time.

Whether it comes *mostly* from the spores dropped on the pastures, or from the fungus growing on the larger vegetation, the preservation of the diseased animals propagates and increases the fungus and correspondingly increases the danger of the occurrence of new attacks. The true course is to arrest the development of the deleterious agent in all

places, and on all objects where it exists; therefore it is to the interest of every stockowner to put a speedy end to the life of the fungus, whether found on plant or animal.

In the animal, so long as the disease is purely local, it can be arrested by scooping out the fungus and diseased product and dressing the part with iodized phenol. This I have practiced successfully for twelve years. But it is evident that in the case of multiple and internal deposits, such local treatment is inadequate, and slaughter is the rational resort in all cases where such secondary or internal deposits appear.

For the pastures, culture, drainage, free circulation of air and free admission of sunshine would be obvious resorts. Preventing the ripening of the grasses would also suggest itself.

I would only add that thorough cooking would of course destroy the life of the plant and hence *canned* meat may be safely eaten, even though made from actinomycosis tumor itself. A sufficiently elevated temperature is not, however, always reached in ordinary cooking, and hence, a roast or steak from an actinomycosis ox cannot be considered as above suspicion of danger."

In referring to the general character of this disease and to the manner of its propagation, Dr. H. J. Detmers, of the Ohio Experiment Station, writes thus:

If "the morbid process, and the properties of the cause of actinomycosis were fully understood, it could not happen that, for instance, in the Chicago and in the East St. Louis stockyards, good fat steers with a lumped jaw are condemned, while tuberculous, cattle, trichinous hogs, and hogs affected with swine plague are allowed to be butchered for human food. It is true, there are some men in our country who have correct views in regard to actinomycosis, men who know that the actinomycetes are what the Germans call facultative parasites, or what I have called incidental parasites; that is, organisms which only incidentally invade animal tissues, and acquire pathogenic (disease-producing) properties only by effecting such an invasion, or after having found an entrance into the tissues of an animal organism, but otherwise have their propagation and development and pass their normal existence somewhere else, outside of the animal organism (see Dr. Billings article on Actinomycosis in the Breeders' Gazette of March 19). Dr. Billings is also right in calling the disease infectious and not contagious—if the words "infectious" and "contagious" are to be used in their proper meaning—but his remarks about the German authorities, and especially about Dr. Koch, are uncalled for, because in Germany the terms "contagion" and "contagious" are, and from time immemorial have been, applied to any disease that is or can be communicated, either directly or indirectly, to a healthy organism, no matter whether the disease-producing agency has its original source, or its normal existence, in another diseased organism of the same or of a similar kind or not, or, in other words, whether the disease-producing agent is an obligate (true) parasite, or only a facultative (incidental) parasite. It frequently happens that even technical terms made use of in medicine do not find precisely the same interpretation in all modern languages. That I may not be misunderstood, I will say right here that although I do not find any fault with those who apply the terms "contagion" and "contagious" in their broadest sense, justified by usage only, I call only such diseases contagious as are directly, or by contact communicated from one organism to another. So, for instance, scab and mange, or lousiness, I call contagious diseases, while all those pro-

duced by facultative (incidental) parasites which, as a rule pass their existence and have their development and propagation outside of that organism in which they become pathogenic (disease-producing), I call infectious diseases."

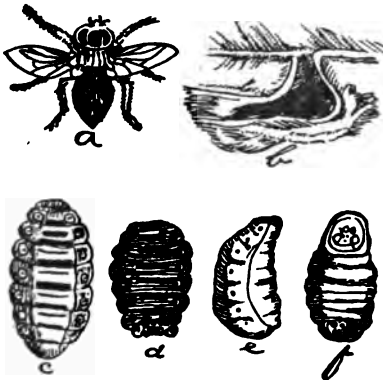
The Warble Fly.

(*Cestrus bovis*.)

The loss to the eastern farmer from this insect is usually the indirect one of the effect produced upon the animal by the instinctive fear of the fly; but to the western cattle grower the damage has a wider aspect; in a recent number of *Insect Life* the following estimate of the loss is made:

"The amount of this loss can be better appreciated by reproducing, in condensed form, the approximate estimate of the loss on the hides of cattle received at the Union stockyards of Chicago, during the grubby season, which includes the months from January to June. Using the reports by states above given as a basis, it is estimated that fifty per cent. of the cattle received are grubby. The average value of a hide is put at three dollars and ninety cents; and while from the report referred to, one-third value is the usual deduction for grubby hides, in this estimate but one dollar is deducted, or less than one-third. The number of cattle received in 1889, for the six months indicated, was 1,335,026, giving a loss on the fifty per cent. of grubby animals of \$667,513. When to this is added the loss from depreciated value and lessened quantity of the beef, the amount for each infested animal is put at five dollars, indicating a total loss on these animals from the attack of the fly of \$3,337,565."

In England the loss is also great, and Miss Ormerod, who devoted considerable time to the study of the insect and the collection of statistics relating to its damage, gives the following estimate: "The aggregate amount of this loss is something enormous. As I have previously noted elsewhere this is variously estimated, by different practical men, as being from two to seven millions pounds sterling (\$9,500,000 to \$34,000,000) at the least, per annum. "Mr. R. Stratton of the Duffryn, Newport, Monmouthshire, who has devoted special attention to the warble loss, writes me: "I am sure it cannot be less than one pound (\$4.85) per head of horned stock, and it is probably much more."



A, fly; b, section of warble; c, maggot; d, maggot shortened for pupation; e, pupa; f pupa, showing fly inside. (After Ormerod).

The engraving, copied from Miss Ormerod, shows four forms of the fly's existence and also its manner of effecting a lodgement under the hide of the animal; at "a" we have the full grown and perfect fly ready to begin the work of laying its eggs; at "b" we have the sack or pouch in which the "warble" lays under the skin; at "c" we have the maggot or worm as it is found under the skin; at "d" we have the same shortened preparatory to going into the larvæ state; at "e" we have the pupa, and at "f" the pupa with the fly partially shown inside.

During the spring and early summer months the fly lays its eggs on the backs of the animal, and as soon

as hatched, instinct leads it to bore into the hide and form its sack under its surface; there is nothing to prove that the act of depositing the egg gives the animal any pain, and the great uneasiness which accompanies the presence of the flies is due to instinct and not pain. During the summer, the worm or maggot increases in size and the irritation caused by its presence produces a discharge from the opening; the sack, with the increase in size of the worm, increases and may be readily felt or seen on the surface of the skin; when its course in that condition has been perfected, the worm emerges tail first from the sack, drops to the ground and soon finds shelter under a light coat of earth or other loose material where it finishes its existence and in turn becomes a perfect fly ready to perpetuate its species.

As soon as its existence under the hide can be determined, it may be destroyed by a strong pressure between the thumb and finger, when it will shoot out of the sack and can be destroyed, or not being sufficiently mature will die; where they exist in considerable numbers the most economical course is to touch the lumps with cheap oil, grease or even coal oil; the worm breathes by minute openings which are closed by the oil, and suffocation ensues.

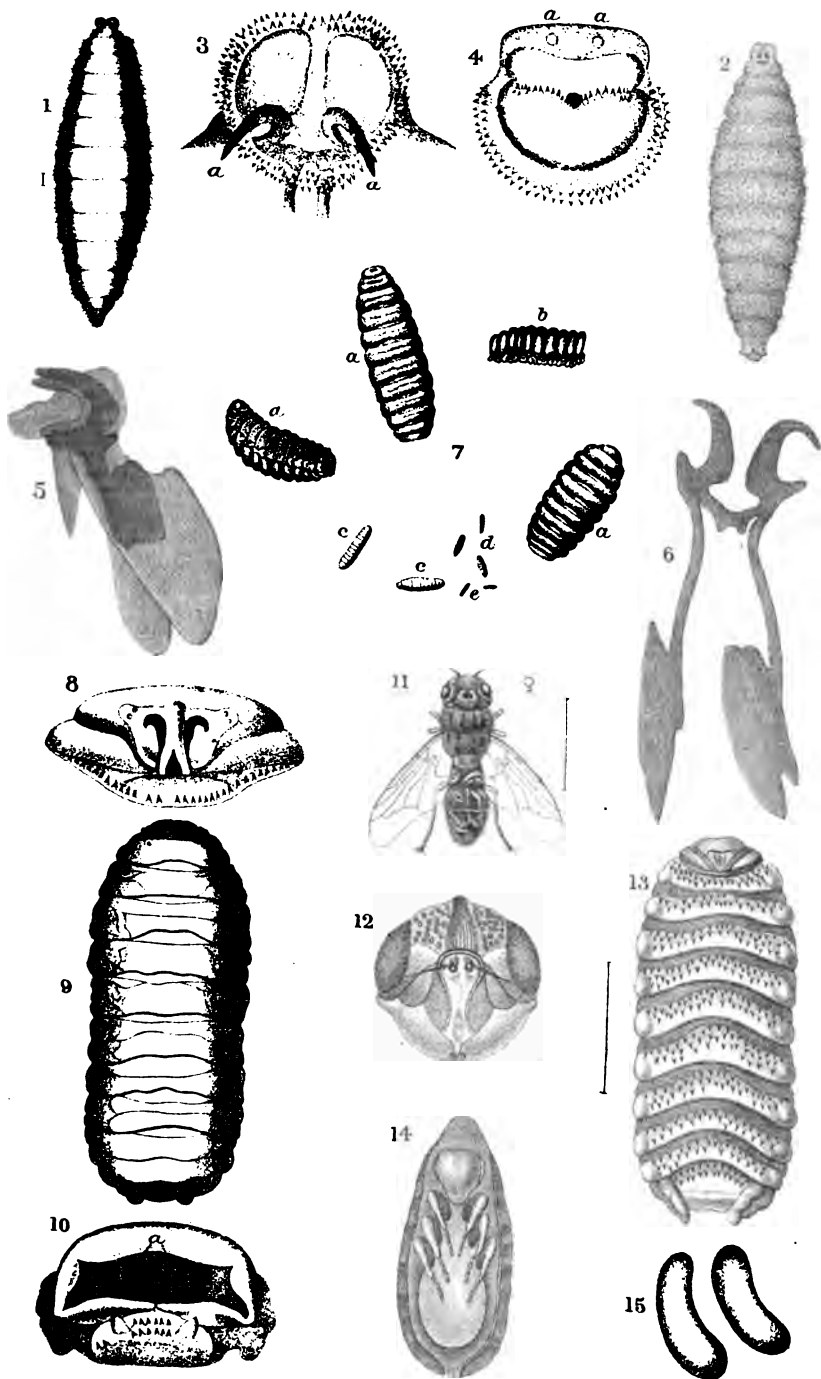
In referring to the effect of these sacks on the hide, Bracy Clark writes as follows: "After the exit of the caterpillar the abcess disappears, and the wound in the skin closes up and is healed in a few days; but although the skin heals up on the exit of the larva, we may remark that the union is not so firm as was the original skin, but is effected by a sort of agglutinating deposit, which afterwards, on the skin being dried and hammered by the tanners, gives way and cracks again in these places, showing union to have been of a less perfect nature than the original skin; the succedaneous nature of the repair of broken skin has been remarked by late physiologists and we mention this fact as confirmatory of their doctrine".

In alluding to the effect produced in European herds the same authority writes as follows: "And such is the dread and apprehension in the cattle of this fly, that I have seen one of them meet a herd when almost driven home, and turn them back, regardless of stones, sticks and noise of their drivers; nor could they be stopped until they had reached their accustomed retreat in the water."

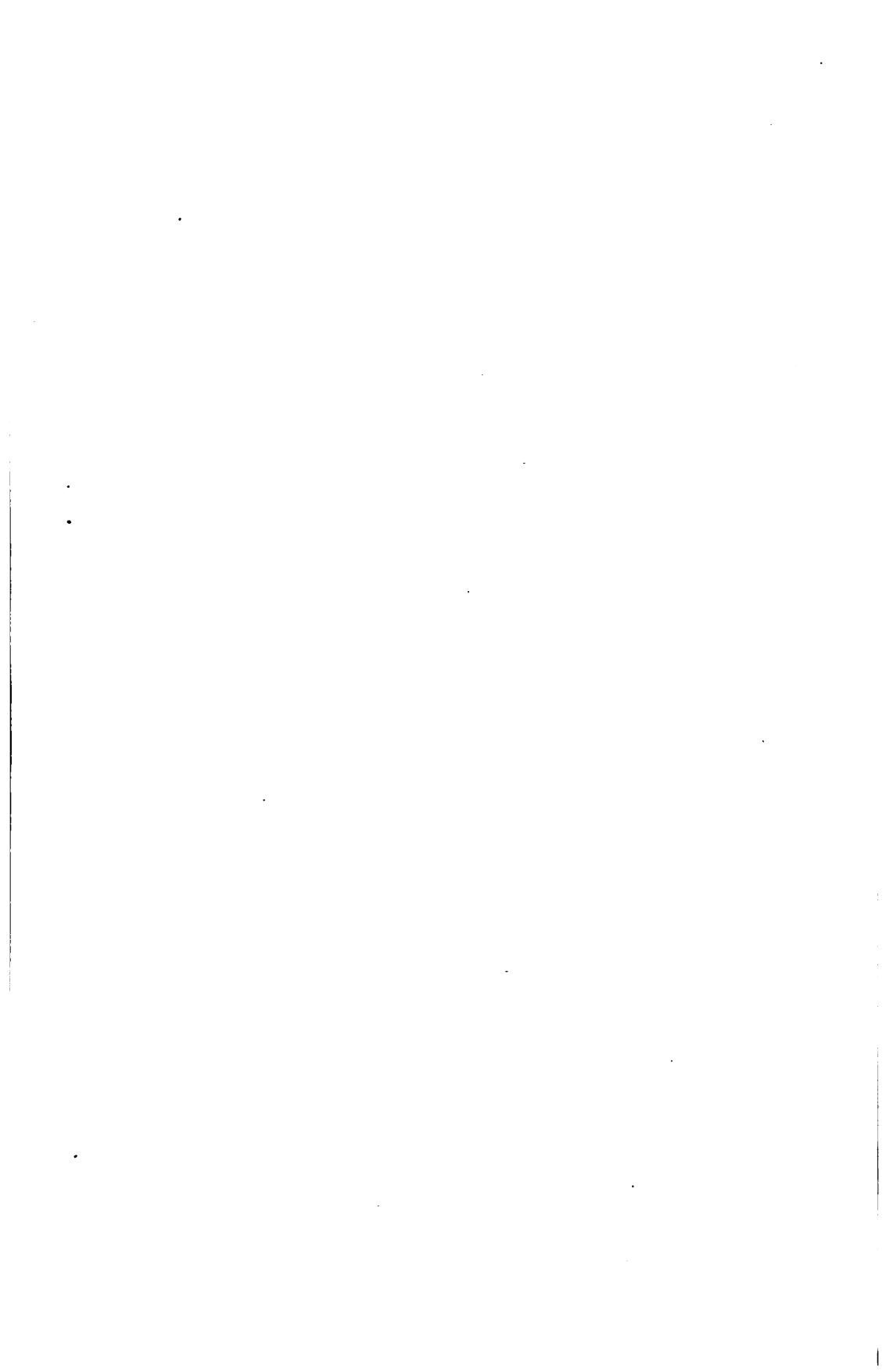
DESCRIPTION OF PLATE.

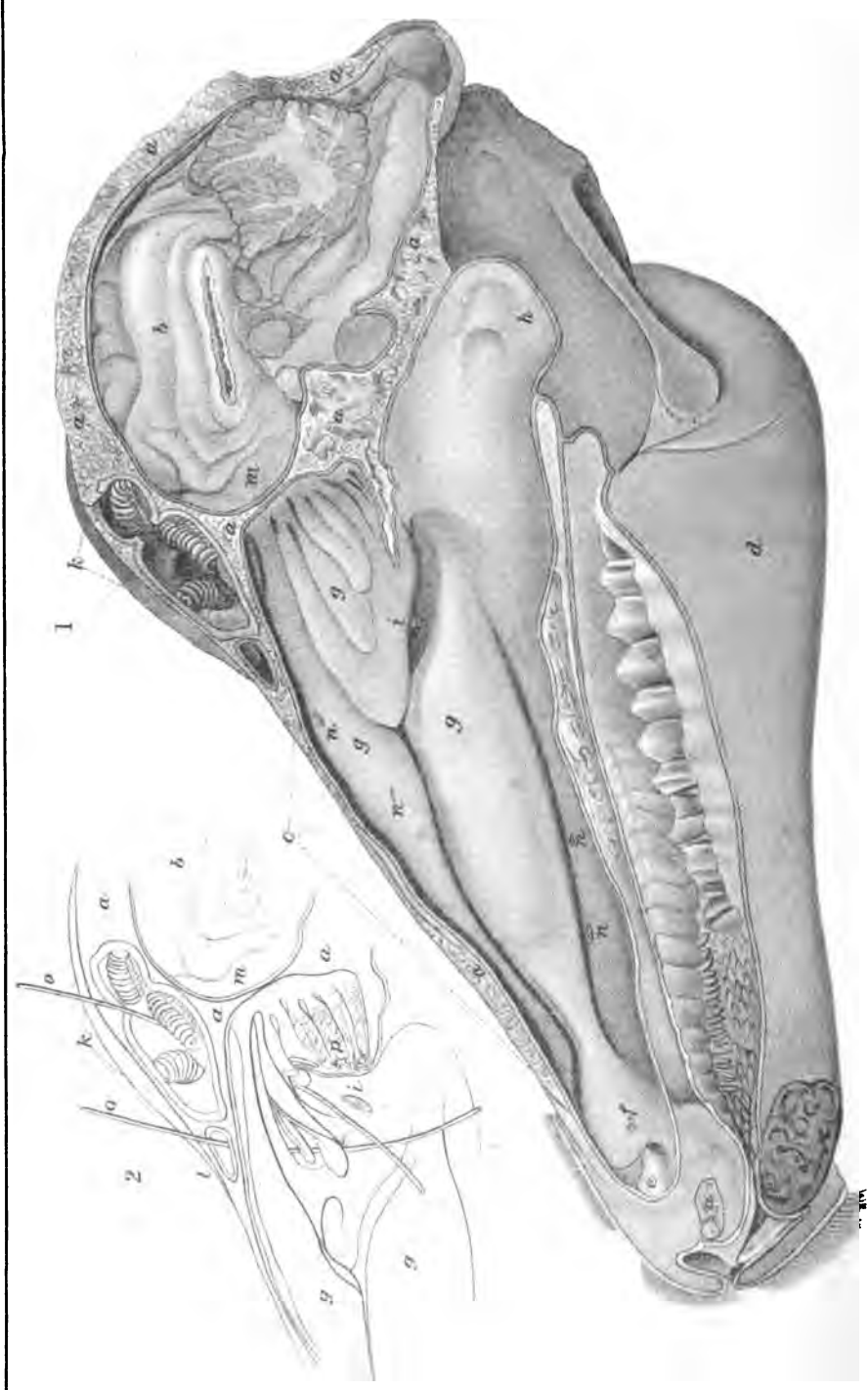
- Fig. 1. Larva in the first stage. Dorsal view.
 " 2. Larva in the first stage. Ventral view.
 " 3. Head of larva in the first stage; *a*, hooks by which the parasite attaches itself to the mucous membrane.
 " 4. Tail of larva in the first stage: *a*, the stigmata or breathing pores.
 " 5. Hooks of well-developed larva.
 " 6. Hooks of very young larva.
 " 7. Larvæ in various stages of growth; natural size: *a*, *a*, *a*, fully developed larvæ in the third stage; *b*, three-fourths developed; *c* and *d*, yet younger larvæ, possibly in the second stage; *e*, the youngest found, and those from which figures from 1 to 4 were taken.
 " 8. Cephalic end of full grown larva (Brauer).
 " 9. Dorsal view of full grown larva (Brauer).
 " 10. Caudal end of full grown larva (Brauer): *a*, stigmata or breathing pores.
 " 11. Adult female fly with line indicating natural length (Brauer).
 " 12. Front view of head of the above (Brauer).
 " 13. Ventral view of full grown larva, showing the spines which enable the parasite to push itself along the smooth, soft mucous membrane.
 " 14. Pupa case dissected to show the imago or young fly within (Railliet).
 " 15. Eggs taken from fly (Railliet).

(From the report of the National Department of Agriculture.)



OESTRUS OVIS, The Gad Fly of Sheep.





MESIAL SECTION OF SHEEP'S HEAD INVADED BY CESTRUS LARVÆ.

Grub in the Head.

(Estrus ovis, Linn.)

This pest of the sheep breeder and feeder, though much more troublesome in England and other moist climates, and most troublesome here in low pastures, is yet of sufficient importance to warrant the attention and care of the Pennsylvania breeder. With us the presence of the grub is usually not attended with danger to the animal but this is mainly due to the fact that they do not usually obtain lodgement in sufficient numbers to cause serious trouble; if our climate was more favorable to development and sheep husbandry more common, this result might be different.

The parent fly is thus described by Prof. C. V. Riley in his report on the insects of Missouri:

"In this stage it looks something like an overgrown house-fly. The ground color of the upper part of the head and throax is a dull yellow, but they are so covered with little round, elevated black spots and atoms (scarcely distinguishable without the aid of a magnifier) that they have a brown appearance. The abdomen consists of five rings, is velvety and variegated with dark brown and straw color. On the upper side it is of the same color, but nor variegated in the same way, there being a dark spot in the middle of each ring. The feet are brown. The under side of the head is puffed out and white. The antennæ are extremely small and spring from two lobes which are sunk into a cavity at the anterior and under part of the head. It has no mouth and cannot therefore take any nourishment. The wings are transparent and extend beyond the body, and the winglets, which are quite large and white, entirely cover the poisers. Its only instinct seems to be the continuation of its kind. It is quite lazy, and, except while attempting to deposit its young, its wings are seldom used".

Unlike the bot fly of the horse, this parasite deposits its young alive, in the larva state, upon or very near the nostril of the sheep; it here attaches itself either by a glutinous matter in its body or by hooks, to the skin and soon works its way into the nostril, where it at once inserts a series of hooks formed for the purpose and gradually works its way upward and into the cavities of the head.

The panic caused in a flock of sheep by the appearance of one or two of these flies is not caused by a fear of pain, but is the result of instinctive dread of a known and well-recognized enemy to comfort.

While going through its progressive stage in the nostril and head of the sheep, the larva causes no little irritation and in cases in which a

DESCRIPTION OF PLATE.

Fig. 1. Section of head of sheep made a little to the right of mesial plane; *a, a, a*, section of bone surrounding *b*, the brain, and *c*, the nasal cavity; *d*, the lower jaw bone; *e*, nostril; *f*, opening of tear duct; *g, g, g*, turbinated bones; *h*, the posterior opening of the nasal cavity, and near the opening of Eustachian tube; *i*, placed on the turbinated bone over a grub in the groove leading to the frontal sinus; *k*, the frontal sinus; *l*, the nasal sinus; *m*, the thin perforated plate of bone called the cribriform plate; *n, n, n*, larvæ of *Estrus* ascending the nares and wandering about its surface; *i*, one ascending to the sinus; *k*, opposite three, nearly mature larvæ in the sinus. Figure reduced to three-fourths of natural size.

Fig. 2. Outline drawing of the skull surrounding the frontal sinus after removal of part of the turbinated bone, lettered as in Fig. 1; *o, o*, straws passed through the channels connecting the nares with the sinuses, marking the path by which the larva reaches the sinus; *p*, cut ends of the removed bones.—(From the report of the National Department of Agriculture.)

number find lodgement in the same animal, may cause serious complications and even death. Offensive matter is discharged from the nostrils and the discomfort of the animal is made apparent in so many ways that the experienced sheep owner can have but little trouble in detecting its presence. All attempts, aside from preventing the presence of the fly and the deposit of its larva, are to be directed to the dislodgement of the larva during its earlier stages; snuff blown up the nostrils, by causing excessive sneezing, is beneficial; decoctions for injecting up the nostril have been recommended and have found some few advocates, but thus far all practical benefits have resulted from the use of irritants which may possibly dislodge the larva in the way before alluded to.

In pastures in which the fly is very numerous, it has been found advantageous to occasionally plow fresh furrows, into the soft earth of which the sheep will push their noses as soon as they detect the presence of the parent fly among them. Others have found advantage in the use of tar, which the instinct of the fly leads it to avoid as dangerous to its larva; salt spread on tar, or salt fed in such a way the nostrils of the sheep must come in contact with tar, is considered beneficial by many.

When it has reached the proper stage the larva emerges from the head of the sheep and falling on the ground burrows down to the depth of a few inches and awaits its further transformation. In from three to five weeks the fly emerges from the hole through which the larva passed downwards and is soon ready to deposit its larva on the sheep, and again go through the course of reproducing its kind.

The male fly is seldom seen by the casual observer and is not found with or around the sheep; in fact so secluded are its habits that it is seldom that it is found at all. In no case does it in anyway molest the animals, even by flying around them.

From the fact that three or four of the grubs may sometimes be found in the head of the sheep which have never shown any symptoms, while alive, of their presence, it is inferred that in order to produce serious effects they must exist in considerable numbers; their presence is usually indicated by the efforts of the animal to get rid of some irritation object in the nostrils and this attempt is often most marked while the partially formed larva is progressing up the nostrils. After it has effected a lodgement in the nostril, for a time at least, the irritation apparently decreases, only to be renewed again with increased vigor as soon as the larva has passed a certain stage of its existence. When in considerable numbers these parasites produce giddiness in the animal, and cause peculiar and erratic motions which characterizes the disease.

REPORTS OF HONORARY OFFICERS.

REPORT OF THE BOTANIST.

By THOMAS MEEHAN, *Germantown, Pa., Botanist of the Board.*

The correspondence of this department has not been equal to that of former years, and has been for the most part confined to answering inquiries as to the names of plants—some of them being of weeds that have for the first time attracted attention. None of these have, however, been new to the state; nor does it appear that any noxious weeds are spreading more than usual. Inquiries are sometimes made as to the best method of destroying troublesome weeds. No plant can live if it is not permitted to make green leaves. If the land is full of something troublesome, there is nothing better than to put it in corn, and insist on continuous culture—not leaving the work till the weed to be destroyed has thrown out strong green leaves, but before it has had the chance to make any. Occasionally reports come to the botanist that weeds were not killed by this process. Failure could only come from neglect to hoe or cultivate, until the weed enemy has made some strong green leaves. It is a good lesson for a young farmer to give him some one stubborn weed plant—a Canada thistle or horse-nettle for instance, and let him try the experiment.

In like manner it is wholly healthy foliage that will give full crops. Whenever grain loses its leaves before the ears mature the crop is lessened. An excellent lesson can be had from two hills of corn. Commence to denude the plant of foliage before the silk or tassel forms, and watch the result on the crop. Even those who believe they understand the value of attention to these matters will be surprised with the force of lessons like these.

It has recently been placed beyond all doubt that the continual injury to the foliage of the strawberry by the work of a fungus, which spots the leaves, is what proves the continual degeneracy of varieties. The hundreds of new varieties of strawberries that have been introduced during the past quarter of a century have not given us in any respect better kinds than we then had, but they take the place of kinds that degenerate. When half the leaf-blades are destroyed by the spot, the plant has only half the leaf surface it should have, and suffers proportionately. New seedlings are usually several years before they get the spot. The Sharpless is said to have resisted the attack longer than any one. The methods of culture, necessary though they be, lower vital power to resist the spot. It is said that the strawberry in its wild state is able to resist the spot.

Another instance of the value of foliage, is illustrated by the early fall of the leaf on the pear or other trees, from the leaf fungus, from caterpillars, or from other causes. It is well known that the fruit will not then ripen well.

Perhaps one of the best illustrations is by the loss of leaves on the potato plant by the Colorado beetle, when all know no crop is returned to us.

It is impossible for a plant to continue long without healthy leaves. We can turn this principle to good account in the destruction of weeds

—and to good account also, by doing all we can to keep the foliage healthy in the crops we grow.

A question was put to your botanist, why trees with an abundance of fibrous roots often fail for all the best care in transplanting—while frequently the same trees with sprouting roots did well. It does not seem to be generally known that the fibers of a tree are the weakest part of the root system. It should be stated that the underground or root system of a tree is in many respects, but the analogue or counterpart of the portion above ground. The two systems are founded on the same plan, but slightly modified. The young soft shoot becomes a trunk, while the same structure, pushing down, becomes a tap root. Side branches with leaves push from the trunk, the leaves performing an important part in feeding the tree. The side branches of the roots with fibers do just the same thing. The leaves work only one season and die, and just the same do the fibers. They die annually just as the leaves do. One may see how this is by looking at the fibers of an English ivy, a trumpet vine or a poison vine, by which they are attached to something to climb by. None of them are over a year old. The living and dead fibers are all intermixed. Once in a while one of these fibers will get into a cleft of rotten mortar, or into a crevice of dead wood, and then instead of an annual fiber, it becomes a permanent root. We thus derive a double lesson. First, that roots are annual, and second, that a fiber that would, under ordinary circumstances, have but a year of life, becomes a permanent root, when circumstances favor a more than usual supply of nutrition. The same process goes on under ground as we see above. The fibers all die before the twelve months expire, a few only becoming permanent roots among the whole mass.

Another point is worth remembering. If we cut off a branch and place it in water, it will draw in some water, and live for a while, but, unless it sends out new fibrous roots, it will not live long. And just so with a tree. It can take in a little moisture through the surface of old hard wooded roots, but the roots have to make new active fibers before it can make much head-way. It is indeed from the extreme white points of active growing fibers, that the tree derives its chief support. The old fibers, moved with the transplanted tree, have but little vital power. They make the white growing points only with difficulty, and hence are of little value. The fibers that have had vital power to go beyond their original annual condition and are destined to become the permanent roots of the plant, are the ones the tree planter should desire. And these are of value in proportion to their growth and vigor. If a mere annual fiber is of little value, so also are of little value old coarse hard wooded roots that are also sluggish as regards vital energy. If a planter can get a tree with a large portion of real roots of two, three or four year old, removal has the almost absolute certainty of success.

We see from these principles why large trees are often as great failures on transplanting as trees with a great mass of annual fibers and few vigorous real roots. There is little else than a mass of hard, old stubs that with difficulty push out growing white fibers. The endeavor to move such with a large ball is therefore often an expensive failure. We have saved a large ball of earth, but it contains little worth having. The two, three or four year old roots are usually cut off and left in the ground in order not to have too heavy a ball. Occasionally a large tree, so moved, will live and thrive fairly well, but then only because there has been a few young and vigorous roots among the older stubs. These large trees moved with a ball, but without vigorous roots, almost

always put out leaves the first season, and so will some trunks of trees when chopped down and no roots at all to feed them. This comes mainly from feeding on the sap stored in the tree. They usually gradually die away completely within a few years. But if a large tree can be moved so as to carry with it a large number of comparatively young and vigorous roots, there usually follows the same success as follows the removal of younger trees.

THE CAUSES OF DISEASES IN ANIMALS AND PLANTS.

By HENRY LEFFMANN, M. D., *Hygienist and Food Inspector of the Board, Philadelphia, Pa.*

The existence of exceedingly minute organisms, more or less intimately concerned in the processes of putrefaction and fermentation has been known for a long time. Leuwenhoeck, in the latter part of the seventeenth century, with the aid of imperfect instruments, pointed out the existence of several species, and recognized, in a general way, their connection with certain natural phenomena. A comprehensive and correct knowledge, however, could only be attained through microscopes of high class, and we find, therefore, that but little progress took place until a comparatively recent period, when the advances in construction and technology have brought the microscope to a degree of excellence, perhaps not surpassed by any instrument employed by human hands. Incidentally, the discovery of the aniline colors added greatly to the means of recognition. A still further advance, and one of great importance consisted in the employment of solid culture-media, by which the numerous distinct forms in any mixture could be isolated and permitted to develop in the most satisfactory manner. This method is substantially as follows:- A nutritive medium, generally meat infusion with peptone, is mixed with about ten per cent. of gelatin, which causes it to solidify on cooling. If the mass be melted at a low temperature, a small amount of any fluid containing a miscellaneous collection of minute organisms added, thoroughly mixed, and then allowed to solidify, each individual organism will become a center of development and form a colony of its own kind. Thus organisms, too minute to be seen except under high magnifying power, will gradually form a mass visible to the naked eye, a portion of which may be transplanted to a new soil and distributed in the same manner. By this means, sooner or later, a so-called "pure culture" will be obtained, that is a colony consisting of a single species. The earlier investigations into this field were limited by the difficulty of distinguishing the many similar forms, but the employment of these cultures in solid media has afforded means of differentiation, by observing the character of the colonies, and the method and rate of growth between species that, under considerable enlargement, closely resemble each other.

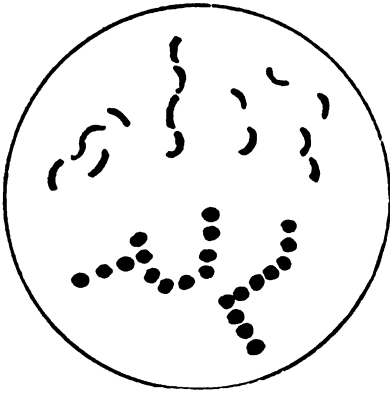
The question of the causation and propagation of infectious diseases has always been one of gravest interest to humanity. Disease and death are the inevitable portion of every living creature, but it is plain to even the casual observer, that, through ignorance or neglect of natural laws, much unnecessary disease and premature death occur. The history of many of these diseases indicated so plainly an origin of specific character, that before any precision had been reached, many medical men and sanitarians had assumed the existence of specific disease germs.

At the present time, however, our knowledge has reached a sufficient degree of exactness to enable us to foresee the general direction in which further development will take place, and it is the purpose of this essay to present some of the distinct results which have been obtained, and to point out some of the probable results of future investigations.

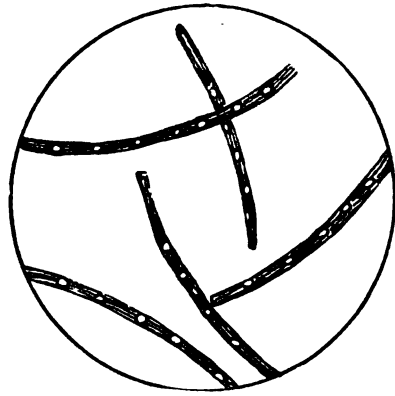
Mankind learned, early in its history, by sad experience, that some of the more fatal diseases are propagated by direct conveyance of morbid matter from the sick to the well—contagious diseases—and that others are apparently distributed by agents which affect localities rather than individuals—infectious diseases. Small-pox is an example of the first class, and cholera of the second. Nevertheless, our ideas as to the nature of contagion remained vague and general, until a very recent period; until, in fact, the means of research had been developed, as pointed out above. The difficulty of distinguishing a specific disease germ, rests largely in the fact that there is a multitude of similar forms existing in air, water and soil, and in the absence of proper culture processes a separate “breeding” of the suspected organism is impossible. When, however, the method was designed the problem was much nearer solution, and “pure cultures” have been an important feature of modern work. It may be well to note here that with very few exceptions, the infectious and contagious diseases owe their origin and propagation to minute organized forms of such simple structure and peculiar life history, that naturalists are undecided as whether to class them in the animal or vegetable kingdom. Most authorities place them in the latter division, but it is possible that ultimately, they will be established as an independent class, or the entire distinction will be abandoned. Speaking generally, we may say that the forms—collectively known as micro-organisms or microbes—are exceedingly minute, and destitute, as far as can be ascertained, of special organs, being merely masses of protoplasm enclosed in a cell-wall. They multiply generally by fission but many of them have the power of forming spores. They require nitrogenous matter and phosphates for their growth and development, are very tenacious of life, and under favorable circumstances multiply with great rapidity. The entire group, which includes many species, is divided into genera, according to external form, a classification that is only provisional. Thus, some forms are spherical, and are known *micrococci*, others are short rods, and are known as *bacilli*, others again are of curved and cork-screw shape, and are called *spirilli*. [See cut 1.]

Most of the species are apparently not concerned in the production of disease, but they produce many putrefactive and fermentative changes, and indeed, we now know that the decompositions to which nitrogenous matter is subject are wholly the results of the growth and development of these organisms.

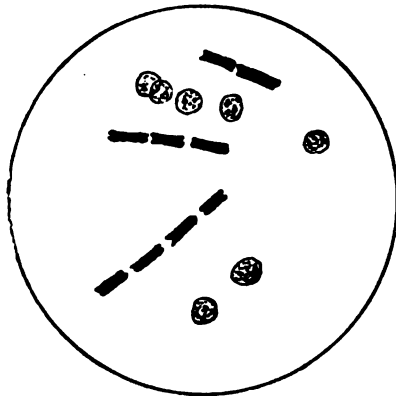
Anthrax the first instance in which a distinct and important disease was traced to the sole agency of microbes, was in the case of the affection known as *anthrax*, *splenic fever*, or *malignant pustule*, which occurs in various domestic animals, and occasionally in human beings. This was traced by Devaine, to the introduction into the blood of a bacillus, the life history of which was still further elucidated by Pasteur and Koch, and since by other observers. No fact in pathology is better established than that this bacillus is the cause of the disease. The importance of the affection, not only from its wide distribution, but also from its destructiveness to valuable animals and almost invariably rapidly fatal nature in human beings, has given much interest to the



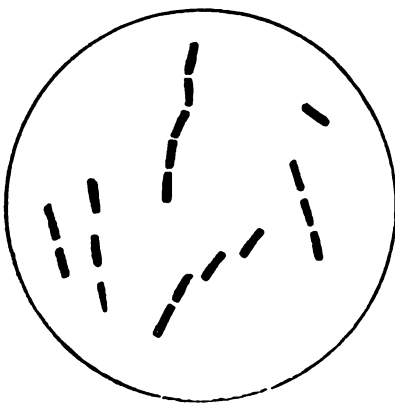
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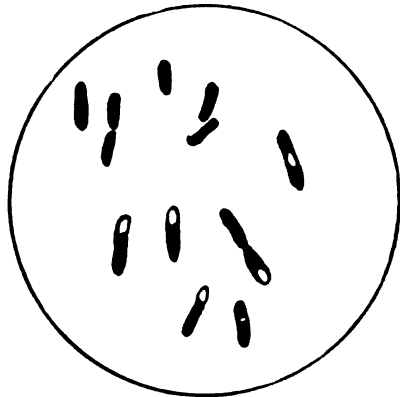
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No. 3.



No. 4.



No. 5.

MAGNIFIED VIEWS OF SOME FORMS OF MICRO-ORGANISMS.

study of the nature of the germ, and we are now in possession of many important facts. A representation of a pure culture of the organism—known as the *Bacillus anthracis* is shown in the accompanying cut. In the early stages it consists of rods about one-five thousandths of an inch in length, but ultimately long threads are produced, which may form a close mesh. [The other cuts 2 and 3 show the bacillus in the blood of an infected animal].

Under certain conditions these rods form spores, that is minute spherical objects within the cell, which are the seeds, and from which develop new individuals. The spores are much more tenacious of life than the adult organism, and, as is usual with such structures, may remain inactive for a long time.

When a pure culture of this bacillus is introduced into the blood of an animal, it multiplies with great rapidity, and soon proves fatal. There is no doubt that the fatal affection known as wool-sorter's disease, which is contracted by those who handle raw wool, is caused by this bacillus.

Tuberculosis.—No disease is of more importance than that commonly known as consumption. Modern authorities have distinguished more than one form comprehended formerly under the general title, but it is now well established that the most familiar form is due to the invasion of a special bacillus, and that under no other condition will the disease be brought about. Tuberculosis, as is well known, generally manifests itself in the lung, but it not infrequently affects other organs. The contagiousness of the affection has been a matter of much dispute among physicians for years. Our knowledge at present indicates that, in human beings at least, the main means of the spread of the disease is through expectorations, which become dry, after which the microbes are raised in fine dust and inhaled by others. There is, however, much difference in susceptibility in different individuals, and also with different species of animals. The common cat and dog, for instance, are very difficult to infect, while the rabbit and the guinea-pig are very susceptible. The organism itself, the *Bacillus tuberculosis*, see cut No. 4, first described by Koch, presents no special distinction in form, but is recognized only by a peculiar susceptibility to staining fluids.

Typhoid fever.—The diseases above referred to, anthrax and tuberculosis, are easily communicable to the lower animals, and give rise in them to substantially the same symptoms as in the human subject. There is, therefore, no difficulty in verifying the causative relation of the germ. The disease known as "enteric" or "typhoid" fever is apparently not communicable to the domestic animals, at least not with the typical symptoms—the so-called swine typhoid has nothing in common with that in the man—hence the difficulty of verifying any culture. However, the results of several experimenters have established the existence of a bacillus which is in all probability the cause of the fever. Cut No. 4 is a representation of this organism.

It is doubtful if it possesses the power of forming spores, but it certainly has a great tenacity of life, can live upon either dead or living matter, and either with or without oxygen. It can usually be found in the liver and spleen of those dead of the disease. It can retain its vitality for a long time in water that is free from other organisms, but is soon destroyed by the other harmless water-microbes. Under normal conditions this is a point of considerable practical importance, since it retards the spread of the disease, as owing to the carelessness with which polluting matter is thrown into water courses, the *Bacillus typhosus* must be frequently introduced into running streams.

General action of microbes.—The instance, just given of the specific action of microbes are of rather exceptional nature. The majority of these organisms bring about chemical changes not connected with disease, even in many cases they may be of more benefit than harm. Of the different classes of action it will suffice to mention some of the more important.

Nitrogenous matter owes its liability to decomposition entirely to the action of microbes. This has been amply established, and it is now a common laboratory practice to preserve the most easily decomposable substances, such as milk, beef-infusion, etc., by the simple method of short heating to the boiling point of water, and subsequent preservation in bottles closed with plugs of cotton which prevent the access of germs.

Just as a wheat grain, a sunflower seed and an acorn, planted in the same soil will produce entirely different plants, so we find a great variety of products when different microbes are grown in the same medium, many are capable of converting the nitrogen of organic compounds into bodies of highly poisonous character, analogous to the power poisons existing in plants. This class of products has attracted much attention on account of the evident connection with the causation of disease. Thus it has been shown, that many bacilli such as the *B. typhosus* produce disease not by mechanical action, but by the chemical substances which they produce. To one class of chemical substances produced by microbes, and which are basic in nature, the term "ptomaine" is applied. Acid bodies are frequently produced by microbes. Acetic, lactic and butyric acids are very common products some species have the power of developing distinct colors in the media in which they grow. These are known as "chromogenic" microbes, and are generally without disease-producing power. One form, the *Bacillus synchyaneus*, is the cause of the blue coloration of milk. The organism is shown in cut No. 5 taken from Macé. It does not curdle nor sour the milk. When these, such effects are observed in conjunction with the blue color, they have been caused by other organisms. The blue color, however, is seen more distinctly when the milk is somewhat sour. The microbe does not seem to produce any disease in animals. To prevent the action of this bacillus, it has been recommended to treat the milk vessels with scalding water.

Nitrification and denitrification.—A most interesting series of phenomena elucidated by the study of microbe life, is the formation and destruction of nitrates and nitrites in the soil. The nitrogenous organic matter undergoes decomposition, and although the products vary with the nature of the prevailing microbes, yet in the cycle of natural change the nitrogen ultimately reaches the condition of the nitrate, in which for it appears to be eminently suitable for the nourishment of the higher plants. We are still somewhat at a loss as to the exact nature of the organisms which perform these functions. Several observers have described microbes which have functions intimately connected with these changes, and from the universality of occurrence, it is likely a number of species have such powers. The upper layers of soil are always extremely rich in microbes, but at moderate depths, a few yards, the soil is sterile. The formation of nitrates is encouraged by a slight alkalinity, in fact the action soon stops if the soil becomes acid. Calcium carbonate, (carbonate of lime), generally serves to furnish this alkaline condition and this fact gives some clue to the fertilizing value of lime, although the plant itself may take up little. By maintaining a proper condition of soil, the microbes are stimulated to the work of

conversion of the organic matter, which is thus prepared for more rapid and satisfactory absorption by the higher plants. The differences between the effects of the same fertilizer on different soil may be in part explained by the difference between the microbes present. Nitrates are the last step possible in the oxidation of nitrogen, and are therefore the limit of action. In some cases the effect does not proceed quite so far as nitrites, a lower state of oxidation are developed. The whole subject of the formation of nitrates and nitrites is of great interest, from both a sanitary and agricultural point of view, but although the knowledge is tolerably satisfactory, it is not yet complete. We can have but little doubt, however, that these minute creatures are of the widest influence both for good and evil, and we may also hope from the rapidity with which advances are now made in this department of science, that many important practical results will soon flow from the study of them.

The present paper has merely the object of indicating some of the points on which exact information is at hand or pretty clearly indicated.

THE WILD PIGEON IN PENNSYLVANIA.

By DR. B. H. WARREN, *Ornithologist of the Board, West Chester, Pa.*

PASSENGER PIGEON; WILD PIGEON (*Ectopistes migratorius*, LINN.).

DESCRIPTION.

Length (depends on development of tail) about fourteen inches; extent, about twenty-five; tail has twelve feathers; bill black, legs purplish red; iris red; upper parts including chin, throat and all of head blue; lower parts brownish-red, fading on belly and white on crissum and under part of tail; sides and back of neck glossed with rich reddish-purple. The female and young much duller in color, and female is much smaller than male.

"*Habitat*.—Eastern North America, from Hudson's Bay southward, and west to the Great Plains, straggling westward to Nevada and Washington Territory."

Wild Pigeons, about eight or ten years ago, were found in great numbers in Elk, Forest, Warren, McKean, Potter and Cameron counties. In the region about Emporium, Cameron county, and near Kane, McKean county, immense quantities of these birds were killed, packed in barrels, and shipped in car loads, to the New York market. Mr. M. M. Larrabee, of Emporium, who frequently visited their nesting places or roosts in the localities above mentioned, says that they often covered an area of several miles in the depths of the forests.

The Wild Pigeon is now found in most parts of the state as a migrant, but a few of these birds breed more or less regularly in different parts of the commonwealth. During the last five or six years when seen here, usually only single pairs, or very small flocks, have been observed nesting, and we never see large flights of pigeons anywhere in the state as in former years. In the fall of 1884, I saw about three hundred pigeons, which was the largest flock I have ever observed in the state. A hunter, residing in Potter county, told me he found, in 1888, in the northern part of Cameron county, a flock of about one hundred, which he thought were breeding in that locality. Reports which I have received through the kindness of the following named gentlemen will suffice to show the present status of the Passenger Pigeon in Pennsylvania: About 1870 were very abundant; now very rare; have only seen one in ten years—*James S. Nease, Washington county*: Occasional

visitor, March or April, 1883, a flock of fifteen or twenty—*George B. Perry, Susquehanna county*: Rare; a few breed here—*H. L. Greenlund, Warren county*: The pigeon has nested within the last ten years three times on Potato creek, near Smethport, McKean county, but do not think they have been there for three or four years past—*James A. Teulon (letter July, 1889), McKean county*: Rare migrant—*J. L. Camp, Bradford county*: Straggler—*R. C. Wrenshall, Allegheny county*: Breeds very sparingly in a few localities in Crawford and Erie counties—*George B. Sennett, Erie county*: A rare visitor—*N. F. Underwood, Wayne county*: Occasional migrant—*Dr. H. D. Moore, Somerset county*: Small flocks and scattered birds are now seen—*M. M. Larrabee, Cameron county*: In former years Wild Pigeons in large flocks were found roosting and breeding in the beech woods along Bowman's creek, in Wyoming county, and in Lake and Ross townships of this county, but in the last six years have seen only small flocks, and oftener only single pairs in Wyoming county. Last year (summer, 1889) I saw a number of single pairs and their nests in Lake, Ross and Fairmount townships in this county—*David J. Linskill, Luzerne county*: No Wild Pigeons through this section since 1875, at which time they were very plenty, feeding principally in the mountains. A few stray birds have been shot this fall (1889) along the South mountain, which causes me to think that they may occasionally breed in this locality, but not in such numbers as to attract attention—*T. L. Neff, Cumberland county*: In the year 1856 this neighborhood was visited by Wild Pigeons in vast numbers. In the early morning they would fly eastward from the Laurel Hill mountains, nine miles east of Masontown, alighting in cornfields to feed; and about the middle of the afternoon they would commence their return flight to their roosting place in the mountains. They would come sometimes in such immense flocks as to almost shut out the sky, like a cloud, and two or three hours would pass during each morning and evening migration. This occurred in the early part of April. Since then there has been two similar visits, but not in such immense numbers, and I cannot now name the years. It has been perhaps twenty years since they were seen here in this manner. Formerly, in the fall, they would be found feeding upon acorns, but they have become very rare of late years—*G. W. Linton (letter July, 1889), Fayette county*. Mr. J. G. Bohn, of Lebanon, says (letter August, 1889): "In regard to Wild Pigeons, they are birds of the past in our regions. Years ago our woods were full of them; in the fall you could count them by the thousands, and here and there you could find them raising young. Our section of country is stripped of its massive forests and these birds are gone. I have not seen one in my hunts in fifteen years. I even cannot as much as get a specimen to mount. Mr. Otto Behr, of Lopez, Sullivan county, in a letter dated February 28, 1889, says: "The last 'pigeon roost' here was in 1869. * * * They say the nesting ground which was along the Mehoopany creek, Wyoming county, four miles from here, was seven miles long by two or three miles wide. In 1876 they started to build up here again when a snow storm that covered the ground for several inches drove them off. Since then they have had no regular nesting place here." Mr. Chandlee Eves, Millville, Columbia county, in a letter of September 24, 1889, gives the following interesting information of the method employed to capture pigeons: "About thirty-five years ago I used to see a great many Wild Pigeons in the spring, many were caught with spring-nets. The party catching them would have a 'bow-house' or bough-house, to secrete

themselves in; they would have a Wild Pigeon—called the flyer—with its eyes sewed shut, which they threw out, and another which they made hover by means of a string from the bough-house. In this way large quantities of pigeons were decoyed, and as they were about to alight the net was sprung over them. Pigeon catching was quite a business with some. The flyer and stool pigeons were kept during the year in cages so as to have a stool pigeon to commence with in the spring. No pigeons have been here for the last fifteen years." The nest, generally placed in a tree, sometimes in bushes, is a flat and frail platform of sticks, so carelessly placed that the eggs, one or two in number, can be seen from below. The eggs measure about one and one-half inches long and a little over one inch broad.

RESULTS OF INSPECTION OF PHILADELPHIA MILK SUPPLY, WITH DESCRIPTION OF PROCESS USED.

By Prof C. B. COCHRAN, *Microscopist of the Board, West Chester, Pa.*

Milk is a liquid somewhat heavier than water. If the weight of a given volume of water at sixty degrees Fahrenheit is one thousand ounces the weight of the same volume of pure cow's milk, at the same temperature, will vary from one thousand and twenty-nine to one thousand and thirty-five ounces. This relation of the weight of a given volume of milk to the weight of the same volume of water is called the specific gravity of the milk. The specific gravity of cow's milk varies from one and twenty-nine thousandths to one and thirty-five thousandths ounces. For the purpose of avoiding decimals the specific gravity is often expressed as a whole number. The fat of milk is lighter than water and consequently tends to reduce the specific gravity. Other conditions remaining the same, the more fat a milk contains the less will be its specific gravity. On the other hand the non-fatty solids (casein, milk sugar and mineral matter) all tend to add weight to the milk, so that the more non-fatty solids a milk contains the greater will be its weight. Since the fat tends to make milk lighter than water, and the non-fatty solids to make it heavier, we see that the specific gravity of a given sample of milk will vary according to the relative proportion of fat and non-fatty solids present in the sample.

The effect of the fat and of the non-fatty solids on the specific gravity of milk has been carefully studied by many of the leading chemists of different countries and quite recently by Hehner & Richmond. After a thorough study these gentlemen concluded that each per cent. of fat present lowered the specific gravity of the milk sixty-six hundredths of a degree (each addition of one to the specific gravity is called a degree) and that each per cent. of solids, not fat, raised the specific gravity three and ninety-four hundredths degrees. In the Analyst for February, 1888, we find the following formula given by Hehner & Richmond $F = .859. T - .2186 G$. In this formula F. stands for the fat in the milk. G. for the gravity and T for the total solids. If two of these terms are given, the third can be calculated from the formula. The accuracy of this formula was proven by Hehner & Richmond from a long series of comparisons with careful analyses made not only upon milks known to be pure, but also upon skimmed milks, watered milks

and milks both skimmed and watered. So confident was Hehner of the accuracy of this formula, that he declared that any analysis giving results at variance with this formula was inaccurately made.

The writer from his own work is convinced of the accuracy of the process when applied to normal milk, be it pure, skimmed, or watered, and even in case of abnormal milks or milks adulterated by other means than by addition of water or removal of cream, the character of the results will often show the abnormality of impurity of the sample.

Richmond has devised a sliding scale from which the total solids can be found when fat and specific gravity are known. An illustration of this scale is here given.

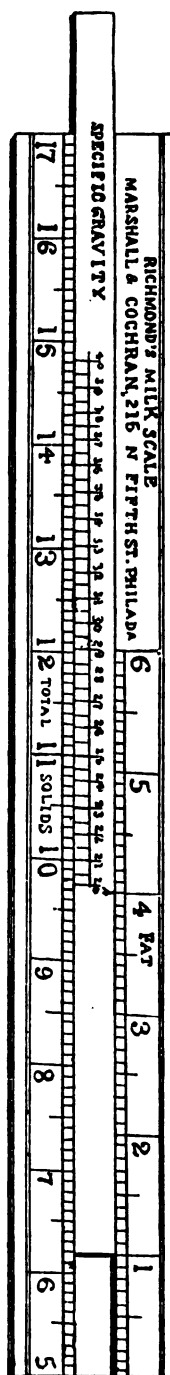
DIRECTIONS FOR USING RICHMOND'S MILK SCALE.

To use the scale bring the arrow head on the sliding scale opposite to the per cent. of fat found in the milk, the number representing the specific gravity of the milk will then stand opposite the total solids. To illustrate, suppose that a sample of milk has been found to contain four per cent. of fat, and to have a specific gravity of 1.031. We slide the middle scale into such a position that the arrow head is opposite the figure four on the fat scale, and we then find that the number thirty-one, on the specific gravity scale, is between twelve and five-tenths and twelve and six tenths on the total solids scale. The per cent. of total solids is therefore twelve and fifty-five hundredths.

In the analyst for September 1890, we find that Richmond has extended this formula to include the calculation of milk, sugar and casein, the specific gravity, fat, total solids and ash being known.

This subject has been explained with some detail because of its great importance in milk inspection. By use of this formula, the accuracy of which has been corroborated by hundreds of analyses in various laboratories in different countries, an accurate and rapid system of inspection is rendered possible. We have simply to find the specific gravity by use of a delicate and accurately graduated lactometer, then by one of the several simple methods now known, we determine the percentage of fat. When the specific gravity and fat are known by use of the milk scale, or by the formula, we can quickly find the total solids. We are now in a position to pass an intelligent judgment as regards the character of the milk. By this method of work two persons can easily analyze one hundred samples per day. It is consequently well suited to purposes of inspection where many samples of milk must be quickly and accurately tested.

As far back as 1885 the New York State Dairy



Commission tested a great many samples of milk by a similar method, although at that time they labored under the disadvantage of having no better rapid method of finding the fat than by use of Feser's Lactoscope. While this will perhaps do well enough for a rough inspection, it is not nearly so accurate as the methods now known for finding the percentage of fat.

About six years ago the writer made some experiments to test the accuracy of Feser's Lactoscope. The conclusion reached from the work was that on fresh milk the instrument would indicate the percentage of fat with a reasonable degree of accuracy, but if the milk had stood for some time and had partially creamed, the indications were quite unreliable.

Prof. Stephen P. Sharples, state analyst of Massachusetts in an article on "The Adulteration of Food," says of Feser's Lactoscope: "In actual work with the instrument, I have not been able to come nearer than half of one per cent. to the actual fat contents of milk and the variation is sometimes wider." Furthermore the formulæ used in 1885 were not so accurate as those now used. One cause of the inaccuracy of the older formulæ (among which Fleischmann's formula is probably the best known) is to be found in the fact that the older methods of fat extraction were not absolutely exact, and different modes of extraction gave different results. With the introduction of the Adams' process, the thorough and complete extraction of the fat was rendered possible and the new formula, which has been based on this improved mode of fat extraction is absolute and doubtless will stand unchanged.

By the method above described, about ten thousand samples of milk taken from the milk cans at the depots of Philadelphia have been analyzed during the past year.

The following tables show the average composition of the milk delivered at the various depots for the months of April, June and October, 1890, or rather the average composition of the samples taken. These, however, we believe to be sufficient in number to fairly represent the quality of the milk supplied to each depot. The samples were taken from the cans as they arrived from the country and before they were received by the dealers.

RESULTS OF ANALYSES OF MILK SUPPLIED TO PHILADELPHIA FROM THE DIFFERENT DEPOTS.

April, 1890.

DEPOTS.	No. of samples.	Sp. Gr.	Fat.	Solids not fat.	Total solids.
Ninth and Thompson,	98	1030.9	3.59%	8.46%	12.05%
Third and Berks,	182	1030.6	3.73	8.37	12.10
West Philadelphia,	165	1031.8	3.98	8.75	12.73
B. & O.	58	1032	4.09	8.79	12.88
Camden,	167	1031.6	3.96	8.69	12.65
Total average for April, . . . . .	. . . . .	1031.4	3.87	8.61	12.48

June, 1890.

DEPOTS.	No. of samples.	Sp. Gr.	Fat.	Solids not fat.	Total solids.
Ninth and Thompson,	80	1031.75	3.47%	8.63%	12.10%
Third and Berks,	58	1032.5	3.76	8.84	12.60
West Philadelphia,	339	1031.98	3.75	8.69	12.44
B. & O.	116	1032.25	3.97	8.83	12.80
Camden,	125	1032.05	3.97	8.75	12.72
Average for June, . . . . .	.....	1032.1	3.78	8.75	12.53

October, 1890.

DEPOTS.	No. of samples.	Sp. Gr.	Fat.	Solids not fat.	Total solids.
Ninth and Thompson,	188	1031.2	4.08%	8.57%	12.65%
Third and Berks,	574	1032.7	3.76	8.90	12.66
West Philadelphia,	409	1032.6	4.21	8.98	13.19
B. & O.	99	1032.8	4.29	8.98	13.27
Camden,	188	1033.5	4.09	9.14	13.23
Average for October, . . . . .	.....	1032.56	4.09	8.91	13.00

These tables show a gradual improvement in the quality of the milk from April to October, although not so decided as the writer had expected to find. They also show that the best milks have been obtained at the Baltimore and Ohio depot. The next best milks came from Camden and West Philadelphia, while the depots at Ninth and Thompson and Third and Berks supplied milk of a poorer quality. The milk delivered at the Baltimore and Ohio depot is collected along the main line of the Baltimore and Ohio railway and the Wilmington and Northern railway. The milk taken at Camden comes from New Jersey. From the West Philadelphia depot is obtained milk collected along the main line of the Pennsylvania railroad and its branches, the Philadelphia, Washington and Baltimore railroad, the Baltimore Central railroad and the West Chester branch. The milk collected along the main line of the Philadelphia and Reading railroad and its branches is delivered at Ninth and Thompson, while that from the North Pennsylvania railroad and branches is landed at Third and Berks.

By far the greater part of the milk inspection undertaken in this country is accomplished by use of the lactometer alone. This instrument, when properly graduated and carefully used, is an exceedingly valuable aid in testing milk, but when graduated, as it usually is, to indicate per cent of water added to milk as an adulterant, its results are totally unreliable. The most that can be said for such an instrument is that it pretends to give the per cent. of water present in excess of that found in the poorest of milks known to be pure. But even this it can not do with any degree of certainty. (As a matter of fact the most careful analysis will not reveal the percentage of water added to a milk unless the same milk be analyzed previous to its adulteration with water.)

That the idea of determining the per cent of added water in a given sample of milk by use of the lactometer is absurd is clearly shown by a

consideration of the following facts. Pure milk varies in gravity from 1029 to 1035. Suppose a sample of milk is found to have a gravity at sixty degrees Fah, of 1028. It is very likely that such a milk has been watered, but how much water has been added is a question impossible to settle without knowing the original density of the milk. If the original gravity was 1029 then there is present three and four-tenths per cent. of added water but if it was 1034 then the milk contains about fifteen per cent. of added water, and as the density may have been anywhere between these numbers, the per cent. of added water may have been represented by any number between three and four-tenths and fifteen per cent.

The basis for calculating the amount of added water varies with each degree of density. To lower the density from 1029 to 1028 would require one-twenty-ninth added water, but if the gravity has been lowered from 1034 to 1033 then there is an addition of one-thirty-fourth water.

The results of inspecting milk by the lactometer alone have doubtless been of considerable value in placing some check upon very gross adulteration.

Yet such inspection cannot stop adulteration provided it be kept within certain limits, and it furnishes no stimulation whatever to dairymen to improve the quality of milk produced by their cows. The most the lactometer can do is to give the specific gravity of the milk, and since this depends upon two factors (fat and solids not fat), one of these factors should also be known before an intelligent judgment can be formed.

The following results of the analyses of milk inspected by the lactometer illustrate the practical workings of this instrument when a judgment is formed solely upon its indications.

One hundred and nine samples of milk were taken from cans immediately after they were inspected by official inspectors. Of these one hundred and two passed inspection and seven were condemned. Of those that passed, seventeen were below twelve per cent. in total solids and two were below eleven per cent. Twenty-three were below eight and one-half per cent. in solids not fat, and five were below eight per cent. Fifteen were below three and one-half per cent. in fat and two were below three per cent.

The standard supposed to be adopted for pure milk was twelve per cent. total solids, eight and one-half per cent. solids not fat, and three and one-half per cent. fat.

From the above it is evident that several samples of milk that passed inspection should have been condemned.

The following table shows the results of the analyses of the condemned milks:

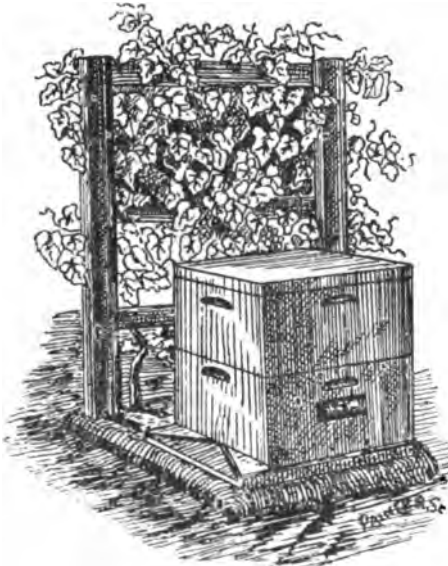
Sample.	Sp. Gr.	Fat.	Solids not fat.	Total solids.
No. 1,	1033.9	4.30 %	9.32 %	13.62 %
No. 2,	1033.9	2.80 %	9.05 %	11.85 %
No. 3,	1027.7	4.40 %	7.76 %	12.16 %
No. 4,	1026.8	3.40 %	7.35 %	10.75 %
No. 5,	1026.5	3.70 %	7.35 %	11.05 %
No. 6,	1026.6	2.70 %	7.21 %	9.91 %
No. 7,	1026.6	3.50 %	7.34 %	10.84 %

In this list of condemned milks sample No. 1 seems to be a milk of good quality. The others are adulterated. Sample No. 2 has the same gravity as No. 1 but No. 2 is partly skimmed. The high gravity of No. 1 has led the inspector to regard it also as partly skimmed. The above results show that even skilled experts are sometimes misled when they attempt to judge the quality of a milk by the indications of the lactometer.

STARTING AN APIARY.

Prof. GEORGE G. GROFF, *Apiarist of the Board, Lewisburg, Pa.*

In the midst of the general depression of business, and the sharp competition which is making all profits small, there are many dwellers on farms and in small towns and villages who are looking about for some means by which they may increase their incomes. Besides a man's regular business he may often attend to other matters, at odd moments, which will prove both a source of profit and of pleasure. Attending a garden or an orchard of small fruits, is occupation of this kind, which brings pleasure, recreation and profit. Here, also, may be classed bee-keeping, an occupation, which, to many, has given pleasure, to some



considerable profit, and to all who have entered into it, in an earnest spirit, relief from the dull and oppressive cares of daily duties, and such an insight into the mysteries of insect life as they never before possessed. The writer believes that while the few may make a great success of specialties in agriculture, just as in other kinds of business, yet the great majority of farmers must continue to be *general farmers*, striving to raise all that they can which is consumed at home, and seeking for any special product which their location or soil may make profitable.

Probably but few farmers have any idea of the financial importance of bee-keeping. From reports of the Depart-

ment of Agriculture, I learn that every state and territory in the union reports bees and more or less honey and wax. California is the banner state in bee-keeping, because of a favorable climate, while New York, Ohio and Tennessee next follow. The annual value of the honey and wax is almost equal to the rice and the hop and buckwheat crops respectively, and exceeds our cane molasses, and both maple syrup and maple sugar. It largely exceeds the aggregate value of all our vegetable fibers, excepting cotton, and in 1879 was half as large as the wine product

of the year. "For the year 1879, the official figures are 25,743,218 pounds of honey, and 1,105,689 pounds of wax." In 1884, the estimated annual product of honey was placed at from \$15,000,000 to \$22,000,000, and the wax product at \$1,000,000, and yet not more than 8 to 10 per cent. of those favorably situated for the cultivation of these are engaged in the pursuit.

The spring is the proper time to begin bee-keeping, as it is also the proper time to begin gardening and other farm operations; for after the confinement of winter the mind naturally turns to out-of-door occupations, and an enthusiasm can now be aroused which may be unattainable later in the season. The issuing of new swarms and their capture interests us, as the appearance of new plants, their blossoms and fruits.

WHO MAY KEEP BEES.

Any one who is prompt, careful, patient, and apt, may keep bees with some hope of profit. If he is a lover of nature, so much the better; yet one can hardly long properly care for bees but a love of nature will be developed. Bee-keeping is especially adapted to the aged, the young, or to persons not able to endure the more laborious occupations of the farm; to all who have some leisure in the mornings and evenings, and who especially need some entertaining open air occupation. It is only a few weeks in spring and summer that a small apiary needs much attention, and a few minutes each day will suffice for a number of colonies.

WHERE BEES MAY BE KEPT.

Bees may be kept *anywhere*. On any farm, in any town or village and even in large cities. In the last place named, the writer knows several successful bee-keepers. But bees will do much better in some places than in others. As a rule, the best farming districts will be the poorest for bee-keeping. Regions which are largely uncultivated, in which there are hills and mountains, in a state of nature, will generally be the best regions. The reason for this is that in good farming districts, all the wild plants which produce honey have been destroyed, while in hilly and mountainous districts, these remain. To illustrate: Where the writer lives the only honey plant, which can be depended upon to produce a surplus, is the white clover, while in the mountains a few miles distant the bee-keepers have clover, and, in addition, the raspberry, basswood, and the buckwheat, so that if one plant fails, they have all the others, and in good seasons their bees may be storing honey the whole summer.

The side of a hill or mountain is a better location than either the foot or top of the same, for the bees will have a greater range of season. Near to a wide river or lake is a disadvantage, for many bees will fall into the water while crossing with heavy loads. California is at present the banner state in the Union for honey but the mountains of Virginia and North Carolina ought to be nearly as good.

Those who make a specialty of bee-keeping claim that bees may be made profitable almost anywhere. The writer has had some experience which leads him to believe that there is some truth in the assertion. During two summers he was unable to pay much attention to his bees through stress of other duties, and yet each of these seasons, called "poor honey years" by the neighboring bee-keepers, he had colonies which stored large amounts of honey. These colonies were *all right*;

there was something lacking in all of the other colonies. The keeping the colonies *just right* is what constitutes the successful bee-keeper. The past season the writer saw a colony store sixty-seven pounds of honey while no other colony in the yard gathered a single pound of surplus.

THE PREPARATION TO MAKE.

The beginner should first visit an apiary and talk with an experienced bee-keeper. If possible see him work a day or more with his bees, when more will be learned than by reading twenty volumes while yet without any practical knowledge of the subject. If it is proposed to enter the business for a livelihood, then the whole summer should be spent in the employ of a skilled bee-keeper.

The beginner will not need more than one or two colonies to start with. These will increase as fast as he can learn how to manage and to care for them. There are several races or varieties of the honey bee now cultivated, and though there is not much difference in their value to the experienced keeper, the Italian bees are best for the beginner, because they are of a milder disposition than the common black or German bee. Eight dollars for Italian and seven dollars for German bees is the price which dealers generally charge at present; but they are being offered as low as five dollars per colony by farmers this spring. At the price named, the bees will be in a modern hive with movable frames. The beginner does not want to have anything to do with any other hive. In the autumn bees should be secured for at least one-third less than in the spring.

SELECTING THE FIRST COLONY.

It would be well to have some one familiar with bees to select the colony for the beginner, for there are all degrees of value in bees, as in other articles. If you buy of a dealer, be sure that he is a reliable man; but if the beginner must depend upon himself, then let him go to the apiary from which his bees are to be purchased, on a warm day when the bees are in full flight. The hives from which the largest number of bees are flying are the most valuable, for they will contain the largest number of bees. A heavy hive, rather than a light one, should be selected, and one which casts a swarm the last summer, rather than one which did not swarm.

REMOVING HOME.

After the bees are purchased they are to be removed home. In warm weather this is best done at night for then all the bees are in the hive; though, if the colony is smoked at intervals of half an hour, most of the bees will be secured, even in the daytime. A piece of wire gauze is tacked over the entrance, the hive is placed on a spring wagon and carried to its new location. If the weather is at all warm, the whole top of the hive must be removed and the bees covered with gauze, else there is danger of the bees smothering. In the morning, before the bees are liberated at their new home, they may be smoked, and a board stood up so as to shade the entrance to the hive. This will cause them to mark the new location, so that there will be no loss. On the wagon, the hives should be placed with the frames running parallel with the length of the wagon; in this way they carry best.

THE POSITION OF THE APIARY.

The hives should be in a place warm in winter and not too hot in summer. On dry, never on damp, soil; they should be away from foot passengers, cattle and sweaty horses, and where the morning sun will strike the hives very early, so that the bees may get early to work. In villages and towns, they may be placed anywhere in the back lot, in the garret, in a shed or even on the roof. They should be near the house, that issuing swarms may be readily seen, and that they may receive attention at odd minutes. Shade is not necessary, though in very warm weather it is grateful to the bees. If the location is a very hot one, shade should be provided, and this is conveniently secured by planting a grape vine near each hive and training it to a neat trellis, or a few boards may be laid on the hive. The hives should not be located where they will be subject to driving winds, as these chill the hives, and cause the loss of many bees about to enter them.

ARRANGEMENTS IN THE APIARY.

The hives should be placed near the ground, with a board sloping from the alighting board to the ground. This enables heavy laden bees to enter the hives much better than if they were elevated. A half brick under each corner of the hive gives sufficient elevation. The hives should not be nearer each other than five or six feet; and an irregular order is better than regular rows. The ground about the hives should be kept entirely free from weeds and high grass. It is nicest to have the ground covered with saw-dust, spent tan bark, or plain sand. The hives should tip slightly to the front, to enable the bees to cleanse them easily, but should be level from side to side. Everything in the apiary should present a neat and attractive appearance. The hives should be painted, and white or some very light color is the best because it will be coolest.

TO HANDLE BEES.

To the Rev. L. L. Langstroth, we owe the knowledge that bees when gorged with honey will not sting. Hence, if we can get them in this condition we may handle them without fear. Mr. Langstroth recommended opening the hives carefully and then sprinkling the bees with sweetened water; but of late years, smoke is used to frighten them, when they quickly fill with honey and are handled with ease. The writer uses only a little smoke wears neither gloves nor veil, and yet gets but very few stings. To handle bees, one must be calm, fearless and free from all offensive odors. Bees especially dislike the odor of perspiration, and one perspiring should not handle them. To open a hive, puff a little smoke in at the entrance, wait five minutes, puff some more in, and at once open the hive and proceed to examine it. If the bees are unruly, give them more smoke and wait awhile; in time the smoke will subdue them. A little chloroform on a sponge placed in the smoker will answer in place of the smoke.

Remember never to strike at a bee. Do not be jerky in any of your movements. Don't breathe on them. Don't crush any of them. Don't squeeze any of them. Don't stand in their way when they are busy. This provokes them. If stung on the hand, suck the part until all the odor disappears.

SWARMS AND HONEY.

Have hives in readiness for swarms, one of which you may expect from every good colony. When the bees begin to build new combs at the top of the frames, you should place on the hives the boxes to receive the surplus honey. Cover these boxes well, so that the heat will not escape from the hive, else the bees will not enter the boxes. Don't be anxious to have the bees swarm. If we can only keep our hives crowded with bees, we may expect some honey.

Keep a strict account of the bees, and do not buy appliances except as they enable you to do so from their surplus. This will cause you to go slow until you know your real needs.

NOTES ON TWO NEW PHOSPHATES RECENTLY INTRODUCED INTO PENNSYLVANIA MARKETS.

By DR. WM. FREAR, *Chemist to the Board, State College, Pa.*

Two phosphates have, within a very few years, been introduced into our markets which differ in some important respects from our ordinary phosphatic fertilizers, and one, at least, of which will, in time, be so abundantly produced as to make it worthy of more detailed notice than it has heretofore received in these reports. It is the slag phosphate obtained as a by-product in the manufacture of steel from phosphatic iron, of which we have abundance, by the basic process; it is being actively pushed on the retail market to-day. The other is known as Keystone Concentrated phosphate, and is a phosphate of iron and alumina made from a West Indian phosphate, Redonda or Rodunda phosphate; this article is sold almost exclusively to mixers of complete fertilizers, and hardly appears on the retail market.

Before taking up the peculiarities of these goods, it may be well to call freshly to mind the important characteristics of all substances of value as plant food, as well as of our ordinary lime phosphates in that role. No material is available for plant food unless it be soluble either directly in the moisture of the soils, through which it may then be carried to the plant, or in the acid moisture of the root surface. In the former condition, food particles scattered some distance from the surface of the rootlets, may be drawn into the plant; in the latter condition only that can be taken up which is in direct contact with the root surface.

That the physical condition of a substance used as a plant food has a great influence upon its availability, is proven by long and oft repeated experience. Of two substances of equal natural solubility, that will be most quickly dissolved which presents the greater surface to the action of the solvent, or, in other words, the more finely divided and the more porous substance, other things being equal, will act more quickly as a plant food. Further, the finely divided substance is more readily distributed evenly through the soil.

In our common lime phosphates we find phosphoric acid combined with lime to form three distinct compounds which differ very much in their values for plant food on account of the great difference in the readiness with which they give up their phosphoric acid to the plant; these are commonly known as soluble, reverted and insoluble phos-

phates of lime; their chemical names are mono-, di- and tri-calcic phosphate respectively, because the soluble has only one part of lime (calcium oxide) united with the same quantity of phosphoric acid, which in the reverted and insoluble phosphates, is united with two and three parts of lime respectively. The insoluble form is the only one occurring naturally in any considerable quantity; the other forms occur in the superphosphates made by the mixing of sulphuric acid with the insoluble, which it robs of two parts of its lime, leaving the mono-calcic phosphate, or soluble phosphate, and forming sulphate of lime, gypsum, with the lime thus removed. It is not however, customary to use enough sulphuric acid to rob all of the insoluble in this manner, because such a mixture would be too sticky for convenient use. On standing, there is a further change that occurs in the mixture; part of the soluble and insoluble make an exchange which results in the formation of a quantity of phosphate having two equivalents of lime; this phosphate is the di-calcic or reverted; it is not soluble in water, like the mono-calcic, but it is very much more easily attacked by the plant rootlets than is the original insoluble phosphate. In most superphosphates, however, the "reverted" phosphoric acid is not wholly composed of the di-calcic phosphate; in addition there is some tri-calcic phosphate formed anew by a more extended exchange between the insoluble and soluble, but this newly-formed tri-calcic phosphate is, for some not fully understood reason—possibly because it is in a state of very fine subdivision,—more soluble in the solvents supposed to represent the action of the acid surfaces of the rootlets and may therefore be considered as equally valuable with the di-calcic compound; the reverted also contains, in case the original material held any iron or alumina compounds, the phosphates formed by the action of the soluble upon these compounds; and these phosphates, while more soluble than the iron and alumina phosphates found in natural deposits, tend, on long standing, to become less and less available to plants. The presence of large quantities of iron and alumina phosphate in the original material is, in consequence, unfavorable because not only is the amount of soluble obtainable by the use of acid less, but because this soluble is more likely to change to forms unavailable to the plant, than where the material is free from such ingredients.

There is another class of facts that requires notice at this point by reason of its practical importance. It is in regard to the changes likely to occur in mixing these goods with other fertilizer ingredients. In general it may be said that meat preparations, ammonium salts and and the higher grade potash salts can be mixed with superphosphates without sensibly altering the fertilizing value of either of the articles mixed. On the other hand, if ground tankage, which contains, in the form of ground bone, large quantities of insoluble lime phosphate, be added it would re-act upon the soluble, causing such a reversion as has been described above. If nitrate of soda (Chili saltpeter) be mixed with a superphosphate and allowed to stand for some time before application to the soil, while there results no material change in the availability of the phosphates, a very considerable loss of costly nitrogen occurs. If wood ashes or the cruder forms of potash salts be mixed with superphosphate, the lime and magnesia salts of the former revert the soluble acid of the latter, thus diminishing its availability to the extent of impairing very seriously its capability for thorough dissemination in the soil. A like change occurs if the superphosphate be mixed with loam and allowed to stand, even for a day or two, especially

if the loam be moist. If it be wished too dry a sticky superphosphate, it can be done without loss of soluble, by the use of land plaster.

This brings us to the last class of facts with regard to which it is necessary to speak in this connection, namely, the changes occurring in the condition of the several phosphates upon their application to the soil. As would at once be supposed, these are found to vary with the soil; being very different on heavy limestone clays from those occurring on light sands, or on the acid soils of old swamps. The majority of arable soils are not acid in character, but contain relatively large quantities of lime, alumina and iron salts; in consequence, the soluble phosphates are reverted very shortly after their application to such soils, the di-calcic, iron and alumina phosphates being formed; and where large quantities of iron oxide and carbonate are present, it is believed that a large proportion of the phosphoric acid is eventually combined with this base in the form of comparatively insoluble compounds; this change occurs, however, only after some considerable time. The principal value of the soluble in such soils, lies, therefore, in the more thorough dissemination through the soil secured before the process of reversion has had time to take place. In a very large number of cases, it is found that there is little or no increase in fertility resulting from the application of soluble instead of reverted acid. The tendency of the reverted phosphate of the fertilizer to suffer further change to less soluble forms has already been noted, and will require no further mention. These heavy calcareous soils have if they are well aerated and moist, one great advantage over dry, sandy soils, inasmuch as they admit the use of the cheaper "insoluble" in certain forms, especially in bone. Ordinary raw bone requires fermentation to make it available after it has been applied to the soil; to this end there must be abundance of air, considerable moisture, and heat; in cold, wet soils this change cannot occur any more than it can on dry, baked ground. The nitrogenous compound present in the bone favors its decomposition; but after all, it is found that steamed bone often gives up more of its phosphoric acid the first year after its application, in spite of its diminished content in the former ingredients; in later years it would probably not afford so favorable a comparison. Greasy bones are hindered very much in their decomposition by the formation of insoluble lime soap which coats the surface and prevents the attack of ferments. As can readily be concluded from the foregoing statements, there is no danger of loss of soluble by leaching from such a soil; nor, on the other hand, much danger of injury to the crops by the formation of too concentrated solutions of the fertilizer, such as might occur in dry seasons were there not so much basic material ready to revert the soluble phosphate. In sandy soils both of these dangers exist, in the absence of considerable basic material in condition to cause this reversion; it is therefore necessary to avoid the application of too large quantities of superphosphate at any one time to such soils. In swampy soils there is also a deficiency of basic constituents, and consequent danger of loss of soluble phosphate by leaching; though, on account of the excessive moisture of such soils, there is not so great likelihood of injury to the crop from concentration of the fertilizer.

Owing to the greater acidity of such soils and to the greater amount of carbonic acid formed, if the soils are properly drained, the insoluble phosphates are more freely attacked than is the case elsewhere; this is conspicuously the case with insoluble lime phosphate, ground rock, ground apatite, etc. On the other soils, especially the dry sandy soils

devoid of organic matter, this class of phosphates is, with some marked exceptions, available only very slowly.

SLAG PHOSPHATE.

This is, as has been noted above, a by-product in the manufacture of steel from iron rich in phosphorus, which ingredient very seriously injured the quality of a large number of our ores for steelmaking until the discovery of the basic process. This process seems to have been first discovered and applied by Jacob Reese, of Pittsburgh; but he having been prevented by circumstances from pushing the process into use, it was meanwhile discovered and patented in Europe by S. G. Thomas; but, after much litigation, the patent for this country has been awarded to Mr. Reese. Prior to the settlement of the case, small quantities of the European product, "Thomas slag" as it is called there, was imported, with the hope of opening up a market here. Since the approval of Mr. Reese's claim this importation has stopped, and he has put a small quantity of the home product upon the market under the name "Odorless Phosphate."

The writer is indebted to the patentee for the following facts relating to the discovery and manufacture of this article. He was first started in experiment upon the basic process by seeing the first trial of the Bessemer process in America, in the works of Mr. Holley, who told him that dephosphorization was impossible in the process as conducted; by 1867 he had practically achieved success in the application of his basic lining to the Bessemer converter. His attention having been called to the luxuriance of growth in the neighborhood of his slag heaps, in 1870 he ground up some of the slag to test its fertilizing value. Business reverses following the panic of 1873 prevented his prosecution of further experiment, and in 1878 S. G. Thomas claimed to have invented the process. The litigation following was not finally settled until 1888.

At present, the slag is made only at the Pottstown iron works. From ten tons of iron containing three per cent. of phosphorus, 7200 pounds of slag is made containing about twenty per cent. of phosphoric acid. The slag after cooling, is very hard and tough, and is pulverized in a "cyclone" pulverizer. No acidulation is required before using.

The market for the product is just opening in this country, but in Europe, where it is sold at such a price that the phosphoric acid costs much less than it does in superphosphates or bone, it has found a ready sale; the output there was, in 1887, 682,000 tons; in 1888, 782,000; and in 1889, 910,000, in round numbers. Of this amount, seventy per cent. was made and consumed in Germany.

The following facts with reference to this product are taken from the results of experiments in Germany and England, with a few made in this country.

The mean of several analyses of the Pottstown product made at this station, is as follows:

Moisture.	0.14 %
Water soluble phosphoric acid.	0.00 %
Reverted acid (soluble in neutral citrate of ammonium, 1.09 sp. gr.).	4.71 %
Insoluble acid.	16.39 %

Of this amount of "insoluble" only a little over one per cent. was phosphate of iron. Much higher percentages of phosphoric acid are sometimes attained in European products, where a number of patents

have been taken out for the concentration of the slag subsequent to its removal from the furnace.

Though there is some dispute concerning the number of phosphates of lime present in these slags, there is no longer any doubt that nearly all of the phosphoric acid is present in a compound containing four equivalents of lime, and therefore called "tetra-basic phosphate of lime." This compound is more readily decomposed than the tri-calcic, and is far more soluble in the solvents to which fertilizers are ordinarily exposed.

Prof. Fleischer (Bied. Centralbl., 745), testing with water rich in carbonic acid, with neutral ammonium citrate and with acetic acid, found that it was far more soluble than the ordinary forms of tri-calcic, but not so soluble as di-calcic phosphate. Jensch (Ib. 19, 87) found that citric and oxalic acids readily extracted all the phosphate from the slag, but, under the same conditions, only a small fraction of that in phosphorite (tri-calcic).

It has been urged by many that the sulphides and excess of iron present in some of the slags might be injurious to vegetation. A number of careful experiments show that these fears are groundless. On the other hand, it has been urged that the good effects of the slag are not to be attributed so largely to the phosphoric acid it contains, as to the excess of caustic lime present. Jensch (Ib. 17, 12) effectually set this claim aside by removing the excess of lime from a certain slag and testing it side by side with the original material on two soils, one rich in lime, the other poor; the same crop was obtained with both slags.

The state of subdivision is a very important element in the quality of the slag. Fleischer found that the very finest slag was eight times more soluble in carbonated water than particles measuring one-twenty-fifth to one-fiftieth inch. Wagner (Chem. Industrie, 1885, Nr. 12) testing various crops on various soils got, on the average, three times as great a crop with slag one-twenty-fifth inch in diameter, as with one-twelfth inch slag. Similar experiments by Prof. Ulbricht (Bied. Centralbl 19, 92) gave results approaching these, but indicated that there was no great gain in pulverization below one one-hundred and twenty-fifth of an inch.

So numerous have been the experiments made upon this interesting product within the last five or six years, that it will be impossible even to mention the scope of the more important. An abstract from a few typical results must suffice.

Wagner, after numerous carefully controlled tests upon artificial soils, concludes that two pounds of slag phosphate (with eighteen per cent. phosphoric acid and eighty per cent. fine slag) has during the first year, an effect equal to that of one pound of soluble phosphoric acid.—(Essay on the Manurial Value, &c., of Thomas Slag, 1888.)

Wrightson and Munro (Bied. Centralbl. 15, 654) found the slag considerably inferior, as far as first year's effects go, to an equal weight of superphosphate applied to a light lime soil, while on heavy clay, the effects were equal; but in both cases it gave one-and-five-tenths to two times as much as ground coprolites containing twice as much total phosphoric acid.

Dr. Maercker (Bied. Centralbl. 16, 148) experimenting with fine slag, precipitated phosphate (highly available tricalcic phosphate) and superphosphate applied to barley, oats, potatoes and sugar beets on eighteen different soils, draws the following conclusions:

1. The phosphoric acid in fine slag has fifty per cent. the availability of that in superphosphates on most soils.
2. It can therefore be used on the better soils.
3. On moor soils it is as good as precipitated phosphate.
4. No bad effect was anywhere noticeable.

Dr. G. Marek, in his prize test (Bied. Centralbl. 19, 142) using various soils, obtained the following relative mean increase from the use of the several phosphates :

	WITH CEREALS.		WITH HOED CROPS.
	Winter.	Summer.	
Slag,	29 %	10 %	24 %
Bone meal,	23 %	12 %	27 %
Coprolite meal,	22 %	15 %	28 %
Peruvian guano,	10 %	21 %	33 %

The Ettlinger Consumers' Association, after careful test on a large number of soils, concludes that the slag, either alone, or mixed with a very little nitrate of soda, will give as much grain and straw on summer grain as a very good superphosphate; and that on moist meadows it very greatly increases the growth of clover, while it has no effect on dry meadows. They recommend, however, that it should always be used in connection with other fertilizers to obtain the highest good from it.

Dr. Fleischer and several colleagues (Bied. Centralbl. 15, 524) found that on moor soils, the slag phosphoric acid was just as good as precipitated phosphate when applied to cereals, somewhat inferior when applied directly to potatoes. It was further found that this was the case upon moors rich in lime, as well as upon those poor in that constituent (Ib. 815).

The same investigators found the residual effects of the two phosphates equal, both in the case of clover after oats, and of oats after potatoes.

In some experiments tried at the Connecticut Experiment Station upon moist loam with corn followed by rye, it was found that while the slag was equal to the same money worth of dissolved bone black the first year, on the following crop its residual effect was considerably greater.

Wagner (*loc. cit.*) found the after effect of the slag phosphoric acid to be twice that of an equal weight of soluble phosphoric acid.

Marek (*loc. cit.*) did not obtain quite so favorable residual effects, getting with potatoes on sands, loams, calcareous loams and humus rich soils, and with sugar-beets on fertile loams, the following mean increase :

	Potatoes.	Beets.
Slag,	1 %	27 %
Bone meal,	9 %	30 %
Coprolite meal,	8 %	24 %
Peruvian guano,	2.5 %	18 %

Kreuz (Bied. Centralbl. 18, 205) found that the slag gave a marked increase when applied to most vegetables and small fruits, being less effective with onions and celery, and having no effect whatever upon the cabbage family.

From these and many other results it may be concluded that the slag phosphate may be safely applied in large quantity to any soil without danger of loss by leaching, or of injury to the young plants; but it must be thoroughly distributed by mechanical means, because of its insolubility in water. While valuable on all soils, it attains its greatest availability on moist soils rich in organic matter. It is not so quickly available as soluble phosphoric acid, but still may be applied with very marked benefit to spring crops; and its residual effect, as shown the second year, is, in most cases, greater than that of the soluble. A good many trials have shown a mixture of superphosphate and slag phosphate to be superior to either alone; such a mixture would seem to be especially excellent for sandy soils. In general, though with numerous exceptions, the slag phosphate may be considered as equal to one-half or one-third its weight of soluble phosphate during the first year after its application, and to from one to two times its weight during the second year; while in all cases it is very far superior to unacidulated ground rock.

In mixing, it has the advantage that its value is not impaired by admixture with the cheaper potash fertilizers, and that there is no loss of nitrogen on standing after mixing with nitrate of soda; but if mixed with sulphate of ammonia, there is such a loss. The fine slag has a tendency to cake; to prevent this it has been suggested that it should be mixed with some fine inert organic matter, as turf-meal.

These facts are sufficient to prove the great importance of this product, which can ultimately be placed on the market at a price not far from that of simple ground rock, since it is a by-product in the manufacture of a much more expensive article and can be obtained unground at a cost certainly not greater than that of mining the phosphatic rock and bringing it to the place of consumption. Its importance is not less apparent when we consider the great iron industry of the country and the large number of ores which require the basic process for the manufacture of the best product.

KEYSTONE CONCENTRATED PHOSPHATE.

This is a product obtained from the treatment of Redonda phosphate, for which Griffiths gives the following composition (Treatise on Manures, 1889, p. 114):

Water,	23.23—27.70 %
Phosphoric acid,	19.40—38.52 %
Alumina and iron oxide,	25.65—36.38 %
Sand,	1.95—27.25 %

The writer has not made a complete analysis of the Keystone phosphate, but is indebted to Dr. Genth for one made several years since for the State Board of Agriculture:

Phosphate of alumina,	70.10 %
Phosphate of iron,	16.25 %
Ferric hydrate,	8.77 %
Alkalies,	0.17 %
Quartz and insoluble,	4.27 %
Moisture,	0.44 %

It is well known that iron and alumina enter into combination with

phosphoric acid to form a number of compounds, but very little is known as to these compounds, particularly as to their solubility in the solvents ordinarily active in the soil, nor as to the changes they ultimately pass through by reason of the reaction of other soil materials upon them. There are a number of facts at command to indicate that these compounds differ from each other in availability just as the lime phosphates do, but little has been done as yet to distinguish them from one another; much less to determine their characteristic properties.

Bretschneider (*Jahresber. Agric. Chem.*, 1870, 211) found that to dissolve one part of phosphoric acid from di-calcic phosphate required 29,350 parts of water, from fresh precipitated phosphate (tri-calcic) 87,832 parts, from freshly precipitated phosphate of iron 160,625 parts, and from the same ignited, 732,958 parts; while bone meal required of water saturated with carbonic acid 249,480 parts, di-calcic phosphate 8,916 parts, freshly precipitated phosphate of lime 13,181 parts, freshly precipitated phosphate of iron 146,570 parts, and the same, ignited, 732,958 parts.

König and Kiesow found the following amounts of phosphoric acid dissolved from the freshly precipitated phosphates, using five grams, by a solution of ammonium humate:

Tri-calcic phosphate,	0.199—0.323 grammes.
Ferric phosphate,	0.160—0.213 grammes.
Aluminic phosphate,	0.070—0.272 grammes.

The larger amounts were obtained by using a greater proportion of the solvent.

Fleischer and others (*Bied. Centralbl.* 1883, 87) found that while iron phosphate was more soluble in water than the aluminic compound, the latter was much more readily soluble in moor soils than the former; the humate of lime in these soils seemed to be decomposed to form calcium phosphate; this availability was, however, very greatly diminished as the soils became more cultivable.

The solubility of these compounds in neutral solution of citrate of ammonium is supposed, in the case of superphosphates, to show fairly their availability. Dr. Genth found in the sample of Keystone phosphate whose complete analysis is given above, 48.68 per cent. of phosphoric acid, of which 41.34 per cent. were dissolved by the citrate under the usual conditions of analysis; there was only a trace soluble in water. The writer analyzed another sample, finding 45.67 per cent. of phosphoric acid, of which twenty-two hundredths per cent. was water soluble, and 23.37 per cent. citrate soluble, leaving a residue of "insoluble" three times as great as that found by Dr. Genth. Recent investigation seems to indicate that a very slight departure from neutrality on the part of the citrate solution has a much greater influence upon the solubility of these phosphates than it has upon that of the corresponding lime compounds.

Turning now to field tests, we find that comparatively little has been done. It is well known that in many soils a large part of the phosphoric acid present does not seem readily available to the crop. It is believed that this is due to the formation of difficultly soluble compounds of iron and alumina. Nevertheless, in many cases the application of ground phosphates of these metals has produced good results.

Griffiths (*loc. cit.*) obtained better results from fine ground Redonda phosphate than he did from any insoluble lime phosphate of mineral origin containing the same amount of phosphoric acid.

Fittbogen (*Bied. Centralbl.* 1885, 313) testing equal parts of phos-

phoric acid in soluble phosphate and in ferric (iron) phosphate, in pure sand, obtained with the latter phosphate, 23.6 per cent. of the yield with the former; the presence of humus with the iron phosphate, doubled its efficiency; but the further addition of carbonate of lime, which is present in all arable soils, slightly diminished this increase. Aluminic phosphate tested under similar conditions was nearly twice as valuable as the iron compound where no humus was added, equal where humus alone was added, and slightly superior where the carbonate was also used. Earlier tests by the same writer with barley on a sandy soil, showed the iron and alumina compounds to be equal to precipitated lime phosphate, but very inferior to superphosphate. Still other tests with oats and potatoes, in which slag phosphate gave the highest yield, nitrate of soda being added in all cases, gave with the other phosphates the following percentages of this maximum yield:

Superphosphates,	95.2
Precipitated phosphate,	87.4
Iron phosphate,	79.9

an equal quantity of phosphoric acid being applied in all cases.

Dietrich (*Jahresber. Agric. Chem.* 1881, 276) using equal parts of phosphoric acid with nitrate of soda on a sandy loam, obtained the following results in terms of the unfertilized yield:

Soluble phosphoric acid,	176 parts.
Aluminic phosphate,	151 parts.
Iron phosphate,	168 parts.

Wein (*Bied. Centralbl.* 1880, 647) testing with vetches on a calcareous sand, got the following yields:

Unfertilized,	385.4 grammes.
Phosphoric acid,	489.0 grammes.
Soluble lime phosphate,	517.9 grammes.
Reverted lime phosphate,	720.6 grammes.
Insoluble lime phosphate,	379.6 grammes.
Citrate-soluble aluminic phosphate,	516.2 grammes.
Citrate-soluble iron phosphate,	439.6 grammes.

On the other hand, extensive tests made for a number of years on five different farms in Scotland, failed to show any beneficial effect from phosphate of alumina, although there was a very perceptible gain from the use of ground coprolites, the crop being oats (*Aberdeenshire Agricultural Association*). Similar results were obtained by Haberlandt (*Bied. Centralbl.* 1878, 186).

These results are sufficient to show that in many cases, the citrate-soluble phosphates of iron and alumina are, during the first season, nearly or quite equal to reverted phosphate of lime, but that there are marked exceptions to this rule. Experiments hitherto made do not show any very marked advantage of one soil over another in affecting the availability of these materials; but these investigations are too few to permit any conclusion in regard to this matter. Nothing has been shown concerning the relative effect of these phosphates after the first year.

MIXING.

It is not known that any disadvantage is likely to arise from the mixing of any of the ordinary nitrogenous or potassic fertilizers with these phosphates; but, in the light of the unfavorable changes occurring in the mixtures of the soluble, reverted and insoluble phosphates found in superphosphates made from rock rich in iron or alumina, it seems of doubtful advisability to mix these phosphates with acidulated lime phosphates. Nor is direct evidence tending to the same conclusion lacking.

THE FRUIT FAILURE AND ITS CAUSES.

By CYRUS T. FOX, *Pomologist of the State Board of Agriculture, Reading, Pa.*

The failure of the fruit crop in Pennsylvania in 1890 may be ascribed more or less directly to two causes—the previous mild winter and continuous rain storms about the blossoming period. The year, under ordinary circumstances, would have been one of plenty, so far as fruit is concerned, as the season of 1889 was one of failure, and the trees having had a year of rest would have been prepared to bear full crops. The outlook early in the spring was very favorable to a large yield of fruit of all the different kinds. The trees came into bloom from ten days to two weeks earlier than usual, and were covered with a profusion of flowers. Then came frosts, late in the spring, which nipped the embryo fruit and caused it to drop prematurely to the ground. That an occurrence of this kind was to be feared, the writer intimated in a report which he had the honor of presenting to the State Horticultural Association at their annual meeting in Mifflintown last January. In this report attention was called to the mildness of the season. The year 1889 ended with no frost in the ground and farmers plowing on the last day. In the middle of January the weather was as balmy as in early spring. The fruit buds were pushing and some were full almost to bursting. Peaches and cherries were particularly forward. Such having been the situation, the prediction was ventured that “if this ethereal mildness keeps up much longer there will be no fruit next summer. A sudden change would kill all the buds, and they are in such a condition at present that zero temperature would be fatal.”

Trees which through advantageous location, or superior hardiness, were able to resist the changes of temperature and expanded their fruit buds until they became wreathed in masses of blossoms were subsequently caught by heavy and oft-repeated showers, just at the period of fruitification. The pollen having been washed off the result was barren flowers and a total failure of fruit. In this respect the spring of 1889 was similar, when the rainfall exceeded all previous records of the century. Two successive failures of the fruit crop have made themselves severely felt and greatly discouraged growers. This should have been “the apple year” in Pennsylvania, most orchards in this state bearing full crops in alternate years. Some orchards contained apples, but they were of such poor quality, that only a few were fit to put away for winter use. The insects destructive to fruit seemed to appreciate the general scarcity and labored all the more zealously to dispose of what was produced. The fruit, therefore, that was gathered was imperfect, and its keeping qualities were poor. To compensate for the general failure in Eastern States, apples have been shipped in large quantities from Michigan and Canada, where there were reasonably good crops, the winter having been more of the average sort farther north, and hence, the fruit buds were retarded and were not sufficiently advanced to be damaged by the severe frosts which occurred in the spring.

There were exceptions, however, in Pennsylvania to the general failure. Orchards situated in narrow valleys, surrounded by hills, were occasionally found where there were very fair crops. Orchards well up on mountain sides were also better favored than those down in the level bottoms. Another feature worth mentioning was the compara-

tively large yield of apples in some counties of varieties native to those particular sections. Thus, for instance, the writer saw at the combined Pennsylvania State and York County Fair, held in the city of York, no less than thirty-five entries of York Imperial apples, the fruit being as fine and as perfect as could be desired. The apples were there not only by the plate, as called for in the premium list, but by the basket. It was stated that some orchards in the county of this variety of apples, which is a native there, having originated about two miles from York, were fairly loaded, and a number of farmers were found who rejoiced in having over a thousand bushels each of choice York Imperials. In Berks county, two native varieties—Keim and Krauser—did well this year where all other kinds failed. This should remind growers forcibly of the importance of planting varieties native to their own section. Varieties that do well in New York and the New England states, frequently fail in Pennsylvania, and seem to belong to a different season. The Baldwin, while succeeding well here, is really a fall instead of a winter apple, as in the land of its origin. The Rhode Island Greening only succeeds in exceptional localities in Pennsylvania, and the Northern Spy, a very desirable fruit, is a shy bearer. The writer received several days ago a specimen apple from North Carolina, to be named. It was highly colored and fully ripe, being undoubtedly a fall apple in the section where it was grown. It proved to be the "Wagener" one of our best winter varieties, entirely out of its latitude, but which apparently succeeds very well in North Carolina as an autumn variety.

In passing, it may be well to say in regard to the fruit display at the York fair, already referred to, that it was certainly a remarkable exhibit, considering the general failure throughout the state. There was scarcely an end to the apples, while of pears and grapes there was a profusion. Even peaches were there, and some being as fine specimens as ever graced a table. Of course, in so large a collection, there was some imperfect fruit, but the display as a whole was very creditable to the growers of York and Lancaster counties by whom it was principally made. The writer of this ascertained that the collection of twenty varieties of apples, which received the first premium, was the result of the beneficial treatment of spraying given the trees. The specimens were perfect, but had been prepared with too great care for exhibition, some of them having evidently been rubbed to produce a wax-like appearance. Nevertheless, they were so far superior to any others there in general appearance, that they were given the highest award. The name of the exhibitor was not learned.

The display of apples at the Berks county fair, this year, was also much better than had been expected, and fully sustained the reputation of the county as a splendid fruit section. This and the York fairs had the best fruit of some twenty agricultural exhibitions visited by the writer this fall in different states. Greater attention was also paid to nomenclature, and the revised system of the American Pomological Society was found in force. Thus, the "King of Tompkins County" apple was labeled simply "King," and "Duchesse" stood for the "Duchesse de Angouleme" pear. At some fairs the same apple was found under several names, and half a dozen varieties appeared with the same name. At Orwigsburg, for instance, some half a dozen plates of apples were labeled "Northern Spy," but only one plate of the six proved true to name, and of the others there were no two alike.

California was our Moses this year in the fruit line. The quantities of fruit shipped from the Pacific slope must have tickled the vanity

of Californians mightily. About the only peaches in the market came from that state. In August a statement was widely published that the Delaware Railroad Company had closed its special manifest office which is open during the fruit season the 16th of the month, one month earlier than usual. The shipment of peaches had amounted to only one basket and two crates for the entire Summer. In other seasons the shipments had aggregated nine thousand car-loads, and had never fallen below nine hundred cars. The few peaches that matured on the Delaware peninsula this year were in orchards along the water ways.

Grapes would have been a good crop this year in Pennsylvania, but wet weather caused them to mildew and rot. One grape enthusiast in Chester county—Milton Barnard, of Newlin township—saved his entire crop of twenty-five acres, however, by “bagging” every bunch. He was rewarded for this tremendous amount of work by a most excellent crop of perfect grapes.

The scarcity of other fruits sustained the market for grapes. Small fruits did fairly well, but the season of each was short. The strawberry crop ripened all at once. The wild blackberry did what it could to make up the deficiency in fruit, and “dead loads” of them were gathered. The markets were also flooded with watermelons and cantaloupe which was a fortunate circumstance.

PINK EYE.

(Exuinine Distemper, Influenza, Catarrhal Fever, Cellulites, Epizootica Contagiosa).

By DR. F. BRIDGE, V. S., *Veterinary Surgeon of the Board, West Philadelphia.*

Having had for many years ample opportunity for studying this disease, which has been so exceedingly prevalent in different parts of the country, I thought it would not be amiss to give a few of its symptoms and treatment for the benefit of those who are so located that veterinary advice is difficult to procure. The history of veterinary science shows that the malady is no disease, but was observed in Germany as early as 1648. Great numbers of horses were affected in Europe in 1711, 1712, 1732, where in 1804 and 1806 it visited Denmark, Germany, Italy, and Western Europe. In 1813 and 1814 the Russian army brought it into North Germany where it was frequently called “pulmonal-typhus, horse-typhus, and typhoid influenza.” England suffered heavily from it in 1871 and the United States in the ever memorable 1872 and 1873. The disease making its appearance first in Canada and the west and then travelled east. It is very probable that it was introduced into Canada from England.

In the present article we shall not enter into the pathology of the disease but be content by saying that it is a specific, contagious, infectious febrile disease running an acute course. Its origin is always to be traced to contagion, other causes take no part in its production. Infection results as a rule, from the expired air of diseased or convalescent animals. It may however be transmitted by persons from diseased to healthy animals. After infection, from two to six days usually elapse prior to the first symptoms of the disease. Convalescence occupies very often from one to two weeks; relapses during this period are

by no means uncommon. Those horses, which at the commencement of the disease, are taken off work and comfortably housed in well-ventilated stables and carefully attended to have, as a rule, the disease in a mild form. The first symptoms which are noticed are, loss of appetites, and the temperature at this period usually ranges from one hundred and three to one hundred and five degrees F. There is a disinclination to move, and frequent changes of posture, first one leg being rested, then another and cracking of the joints of the extremities. The pulse at this period ranges from forty to sixty beats per minute, and upon inquiry it probably will be found that the horse has not laid down during the previous night; during the next few days the pulse is increased in frequency to from sixty to eighty beats per minute and the temperature rises in some cases to one hundred and seven degrees F. The respiration is seldom increased above normal, during this period there may or may not be some swelling of the legs, (the swelling is more prevalent among cart horses). The gums and inside of the lips have a reddish yellow color. About the fifth day the eyes are affected, one or both appear weak and are unable to bear any light and overflow with tears. The conjunctive is greatly swollen, inflamed and assumes a deep red color, as soon as the eyes show these characteristic symptoms there is a marked change in the patient's condition, the temperature often falling three or four degrees in twenty-four hours; the pulse becomes slower and the appetite begins to return and the animal lies down for the first time since the commencement of the disease. In ordinary cases the patient soon becomes convalescent.

The crisis of the disease is usually reached about the ninth or tenth day from infection, and where the disease is attended to in the early stages I seldom see any serious consequences, except where the animals are much debilitated to commence with, or aged or worn out. The patient should be comfortably housed in a well-ventilated clean box stall if possible. The limbs hand rubbed and bandaged from the knees down, and, if in cold weather, blanketed. If in warm weather a sheet should be used. Give plenty of pure cold water to drink and to each bucket of water add two drachms or half ounce of nitrate of potash (according to size of horse). Give the following:

Spirits of ether nit., three ounces: spirits of camphor, two ounces, tincture of arnica, two ounces; anomatic spirits of ammonia, one-half ounce; tincture of belladonna, one-half ounce.

Mix and give one ounce, or two tablespoonfuls in a little water every three hours during the day.

Where there is diarrhoea and abdominal pain a half drachm of powdered opium in one-half pint of arrowroot gruel should be given. After the febrile stage is passed and the patient begins to lie down, the following will be of great benefit: Citrate of quinine and iron (ferri quinine citrate), one ounce. Make into six powders and give three a day. Isolation of the sick from the well should be early attended to, to prevent the spread of the disease.

OUR PUBLIC HIGHWAYS—THE BEST PLAN OF KEEPING THEM IN REPAIR.

By JOHN J. MOORE, *Quakertown, Pa.*

In conversation recently, with a native of England, in regard to the surplus in the United States treasury, he said if he had the distribution of it he would use it in making "civilized" roads in this country, that generally they were the most "uncivilized" roads he had ever known. Comparing them with the roads of at least some other countries where the government, with unlimited means and cheap labor, assume the making and repairing of the roads, this may be true. But even with our local resources, applied with skill and good judgment, the result, I think, might be better than it is. True, we have in many instances, especially in the upper sections of this county, to overcome the mistakes of the road menders of former years. How many of us can remember the long strings of farmers' wagons that came every spring time, as regularly as the migrations of the birds, with sideboards six inches high, loaded with about a half perch of stones gathered off some field two or three miles distant, and dumping them into some mud hole made the previous winter, and thus forming the nucleus of two more the next spring, one at each end of the stone pile, to be filled in like manner the next year. Many a road that now, with a little care, could be made smooth and suitable for pleasant driving is marred and roughened by these relics of bygone times.

My belief is that time and means could not be more profitably employed by our supervisors than in picking up and removing from our roads all loose stones that from time to time can be found thereon, and loosening those that obtrude above the surface. This, of itself, would be a great advantage, and, when considered in connection with the coming use of the road machine or scraper, must be desirable as removing one of the objections of their satisfactory use.

While upon many kinds of soil these machines seem to be all that is claimed for them in repairing roads, yet upon heavy clayey soils, especially when interspersed with these stony relics they have not been a success, the draught being too heavy upon the team and the labor too arduous for the workmen. I have seen a remedy for a heavy soil which answered well. With a sharp coulter plow cut a furrow along the outer edge of the ditch, then the machine can gather up the loosened earth without the heavy work and strain necessary to loosen it from the bank. Wherever the use of these machines is practicable they seem to be a very efficient adjunct in the making of good roads. But the main thing is to gather up the loose stones and keep the holes filled up with dirt, using the grubbing hoe much more than the plow to level up the ruts.

I would not have the road bed graded wider than for two loaded wagons to pass each other safely, and the lateral grade to be such as to convey the water nicely to the ditches on either side. These ditches must be deep enough to keep the road bed dry, not merely to carry off the surface water, but to drain the bed itself down to frost lines. When necessary to make breaks or crossways in the road do not let them look as trenches for gas pipes, endangering the loads of hay and springs of wagons that have to pass over them, but let there be a depression in the road bed graded to the proper depth at least six feet on each side

from the center thereof, inclining at each end a little towards the way the water will run.

If any suggestions for better roads are worthy of consideration, how are they to be carried out, the present system, as applied, evidently not being a success? The roads want a more frequent and careful supervision after every heavy rain and during the melting of the snow. Every portion should be carefully examined to see that the water has not broken out of its legitimate channels, washing great gullies in the bed and laying bare the stones and boulders that be thereon by washing off the dirt. This cannot be attended to in due time by two men in a large township.

Two years since, in a neighboring township two men, living close together, were elected as supervisors, each of them living upwards of five and a half miles from the limits thereof. An adjoining township is nearly eleven miles long and has upwards of fifty-two miles of public roads—what can two men in each of these townships do toward keeping the roads in repair? My plan is to elect five or six men, or more, caretakers of the roads in each township, each of them to have the supervision of the roads nearest his farm or dwelling, where he could see almost daily, or his near neighbor could tell him of any defect in his portion of the road, and it could be remedied at once. There is no case where the old adage, "a stitch in time saves nine" is more applicable than in the repair of our roads. A few shovelfuls of dirt properly applied to-day may save the cartage of a load to-morrow.

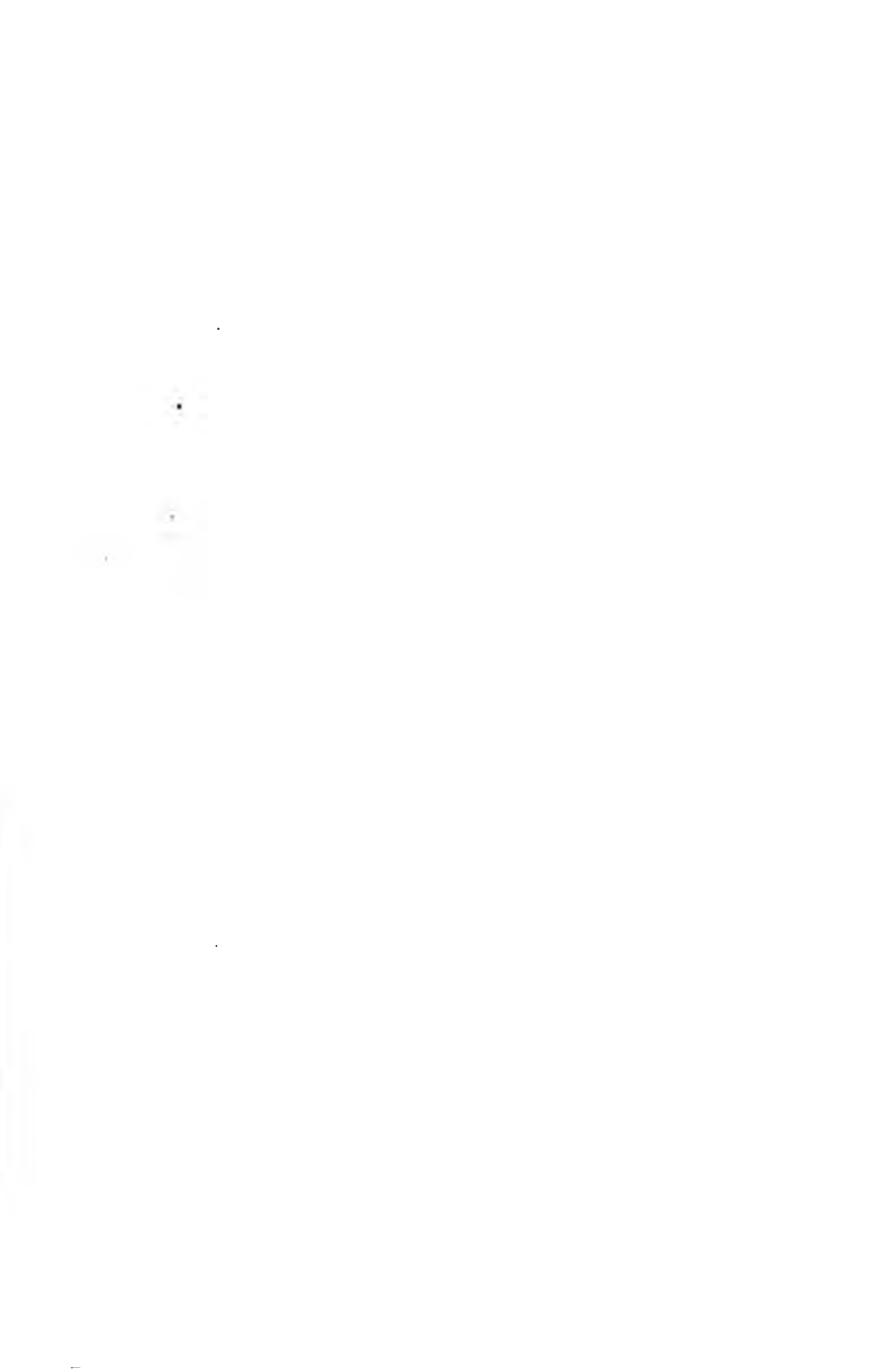
If thus elected would they serve? Yes—there would be a spirit of emulation engendered amongst them that would cause a pride in the completeness of their several portions and especially in the good roads about their homes. They would feel an individual responsibility resting upon them, and this evidence of their neighbors that they are qualified for an important work will make them zealous to fulfill the trust. If any of them should measurably fail to come up to the standard they can console themselves with the thought that the supervisors of the present day are not always preëminent for judgment and executive ability.

Should the law requiring the supervisors to give each person an opportunity to work out his road tax be changed? Yes; under the system of several caretakers I would make it obligatory, and not optional, upon every owner or occupier of land, within their respective districts, to assist himself, or furnish a substitute whenever called upon, to repair the roads, they of course receiving the stipulated price for their services. In various sections of our country where the roads are kept exceptionally good this law is in full operation and works to the satisfaction of all concerned. Then there would be no difficulty in procuring help whenever needed.

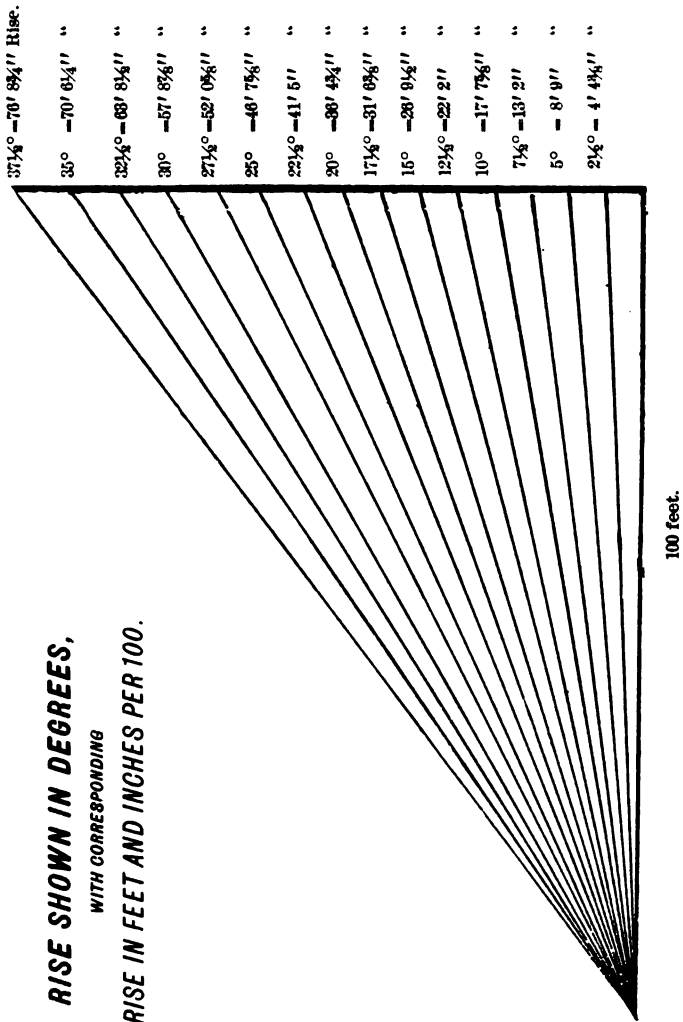
I have thus formulated my views upon the subject as a basis for the institute to express theirs, but above all things connected with the repairing of our roads let us have the loose stones picked off and the water kept in its proper channels.

1 in 10
1 in 20
1 in 24
1 in 26
1 in 30
1 in 40
1 in 44
1 in 50
1 in 100
Level.

DRAFT AS AFFECTED BY ELEVATION.



**RISE SHOWN IN DEGREES,
WITH CORRESPONDING
RISE IN FEET AND INCHES PER 100.**



THE ROAD QUESTION PRACTICALLY AND THEORETICALLY CONSIDERED.

"It is said that the civilization of a country is marked by its roads. If this be true, Pennsylvania cannot claim to have highest rank in civilization. It is safe to say that no expenditure of public moneys yields so little in return as the road taxes of Pennsylvania. Our entire system of road laws—or rather our road laws which lack system—should be thoroughly revised and codified. They served their purpose when temporary roads were to be laid out and cheaply made through unbroken forests and over lands which had but little value. The time has come when it will be economy, in every way, to build our roads permanently and substantially.

"The comfort of our people, economy in the transportation of our products, saving in the wear and tear of vehicles and animals, and the needless multiplication of highways, all demand that the laws governing the laying out and construction of our roads, should be radically reformed and systematized.

"This may be considered a matter of minor importance, and yet it affects every inhabitant of the Commonwealth. We must all use, at some time or other, in some way or other, our public roads. Their character and condition affect the breeding of our stock, the style of our vehicles, the carrying capacity of the farmer's wagon, and the speed and enjoyment of all who travel them for business or pleasure, either in the carriage, in the saddle, on the bicycle or on foot.

"A thorough system should be devised and enacted by the legislature which could be put into immediate effect by our older communities, and adopted by those which are newer as their ability and the wants of their people might require."—*Message of Governor James A. Beaver to the General Assembly, January 1, 1889.*

E. S. HOOVER, Lancaster county. In regard to the cost of constructing and maintaining McAdam roads or turnpikes, I have been gathering the experience of a number of our practical men connected with our turnpikes in our county for quite a number of years, and the general estimate is \$5,000 per mile for constructing our turnpikes, and \$200 per mile for maintaining them annually. An estimate made by A. M. Frantz, Esq., who has been associated with quite a number of our turnpikes as manager and solicitor for quite a number of years, it requires 4,266 perches of stone per mile at ninety cents per perch, amounts to \$3,839.40 properly broken and placed on the road—leaving a balance remaining of \$1,160.60 for grading and preparing the road-bed per mile. This depends somewhat on the distance the stone must be hauled, but it is about a fair average. This estimate is made on the turnpike being twenty feet wide—depth of stone fifteen inches, center of road, and nine inches outside. This would hold good I think in our

These extracts are taken from the correspondence of the Board, from the proceedings of its meetings, from the proceedings of local or farmers' institutes, and from sundry sources available to the Secretary. Their introduction here is for the purpose of showing the drift of public opinion, and the opinions of our leading farmers and thinking men, upon the road question. In many cases we have been compelled, for want of space, to very much abbreviate the matter used, and hence the persons named should not be held responsible for the language used.

SECRETARY.

county, and it will be seen at once that it would be entirely too expensive for our county roads, used for general purposes; in a county where there is plenty of loose material and near at hand the case would be somewhat different.

As regards the payment of road taxes, I think our people are somewhat divided on this question. Under the present law our supervisors must get their help and team from among the farmers along the public roads and in this way most of the road tax is paid, but under a different law and some other system this might be changed for the better.

Our farmers and the people in general are opposed to county road superintendents, believing it would increase their taxes still more, and might have a tendency of taking road making out of the hands of the taxpayers of the district (where it properly belongs) and place it in the hands of officials at the expense of the taxpayers.

An improvement in our system of roadmaking has been suggested by some of our practical men (and I think well of it) it is this—elect a good practical man (or two if the district is large) give him power to hire a few men for the summer months whose duty it shall be, with the supervisor, to repair and keep the roads of the township in proper condition during the year, making that his business; doing just the thing most wanted at the proper time and keeping a watchful care over the roads just as our well-managed railroads are looked after.

Our farmers, as a general thing, think that all classes of property should be taxed for road purposes. At this time particularly, when the farmer is oppressed with taxation and low prices of his products, he looks for relief in some way, and anything that will help him along better will be gladly accepted.

W. G. BERRY, Washington county. To the first proposition, the payment of taxes in money, we will say emphatically, yes, and because we are convinced that no permanent or lasting improvements, either in roads or road laws, can be made unless we abolish the plan of working out taxes.

Farmers as a rule have not time, at the most favorable season for road repairs, to leave the farm, nor in this county (Washington) can men be hired to labor on the roads for wages usually allowed by those in charge of township roads, as a rule, not more than one dollar per diem.

Nor can a man be elected as supervisor who will require of two neighbors and friends an equitable day's labor on the roads.

We must have a man who will devote his time to roadmaking, who will be empowered to employ good hands, and to pay them cash at the close of each week.

The second proposition, that of taxing all classes of property for road purposes, we think must be answered in the affirmative. In this county one single industry, that of oil production, with an average daily production of 10,000 barrels for the month of December, 1889, amounts to, at \$1.25 per barrel, about \$375,000, and for the year ending January 1, 1890, over four million dollars. Then suppose we could tax this product at two mills, we would have the neat sum of \$8,000 for the permanent improvement of our highways in this country; and surely they could not reasonably object, because no other single industry does more damage to the county roads, although the production of natural gas is a great injury to the township roads. A majority of our people could favor the taxation of all classes of property, excepting public buildings and charitable institutions, and with the proviso that the money must be expended in the district in which the tax is collected.

And to the third and last enquiry we must give an affirmative answer. Because, we have come to a point when the leading minds of this commonwealth desire to see some improvement of a permanent character made on our leading roads; and as counties in this state do pay to the State Treasurer a liberal tax on personal property, consisting of bonds, mortgages, etc., many farmers claim we should, in addition to what is received for educational purposes, farmers' institutes, as well as bounties to agricultural societies, receive an annual appropriation to aid in permanent improvement of county roads. We have in the western end of the state, as a rule, abundant material to build permanent roadways: the leading question seems to be by what plan and from what source can we raise the money to carry on this improvement. Allow a word in conclusion and briefly.

First. Our county roads need a more efficient and intelligent supervision and by not more than one road commissioner in each township.

Second. A more thorough system of drainage either by use of stone or tile, and would advocate the latter as the most permanent and economic. The drains to be built in the most advantageous position, either as cross drains or parallel with the roadway, and often immediately under the road bed.

Third. That all county roads must be kept smooth at reasonable times by use of roller or drag, and all loose stones or other material must be removed from the roadway.

JOHN I. CARTER, Chester county. *First.* An effective law must be general, and in order to suit the varying conditions of the different sections, it must have premissive features as well as mandatory.

Second. Effective labor is skilled labor, and hence is the cheapest to employ; but has to be paid cash, therefore, the "working out" of road tax by the taxpayers must be absolutely abolished. There are no two sides to this phrase of the question.

Third. The farmers' fear of increased taxation stands seriously in the way of thorough road improvement; therefore the road tax should be levied upon all classes of property alike, thereby increasing the amount of tax received without increasing the levy rate. This is not only in keeping with sound equity, but is in accordance with the explicit requirements of the state constitution.

Fourth. State aid in some form might be desirable. The building of a state road would be a very difficult thing to make satisfactory. It could not be located so as to make its advantages benefit the whole people or its burdens be equally distributed. Its most plausible use would be to educate the people to know how to make and how to appreciate a good road. Perhaps a better way to give state aid, would be to pay a county road superintendent, or county road commission in each county—said superintendent or commission to be appointed by the county court. The duties of these officers to be largely advisory and educatory. To take such part of the county commissioners present duties as relates to roads and bridges. This superintendent or commission to have as one of their number, or to employ, a competent engineer or road expert, that our roads may be intelligently constructed and judiciously managed. We want a general system of road construction and road repair, and such can only come from a general law, enforced by general officers—at least directing the local or township managements. Of course the very best law may fail in effectiveness if the people are not ready for it, but they may grow to it. All law should be a little in advance of the people, and to that extent be educatory;

and our law-makers should keep the educatory feature steadily before them, when framing an effective roadlaw. If any clause could be included that would require or open the way for the people to come together for consultation or direction, the battle for good roads would be half won. We have the means; what we mainly want, is the will and the know-how.

JASON SEXTON, Montgomery county. First of all I can conceive of no one plan of road building, or road repairing, that will adapt itself to all conditions, soils and localities of the many counties and towns throughout the state needing good roads. A great deal of discretion must necessarily be left for the taxpayers and those authorized by them to build or repair the roads—for in many sections of the state and in many townships, we have nothing but clay soils to build roads of, or to repair them, with stone or any other good material very hard to get, and in many localities would have to be hauled for miles at great expense—while in other localities there is not only plenty of stone but good gravel beds, the best and cheapest of all materials for road making so that, in very many townships, there is no reason why, under the present very defective laws, such townships should not have good and comparatively cheap roads. Yet we know that even in these much-favored localities where there is an abundance of good and cheap material, the roads are often found to be in the worst possible condition, so that under our present very defective system of roadmaking and repairing, even though we have in many townships the best of material, and of the cheapest, it does not follow that such townships have good roads. For while our present road laws have served their purposes well in the years that have gone, and have given as many fairly good roads, yet all thinking and progressive men must now acknowledge that these laws have outlived their usefulness, and must be repealed, if we hope to advance in the line of giving to ourselves and our posterity the priceless boon of good roads. The thrift and prosperity of any agricultural community the world over, is read in the good taste and beauty of their homes—in their well-equipped buildings and surroundings, their well-fenced farms and well-cared-for stock, and I had almost said, the fine condition of their public roads (but how often have we been obliged to apologize for their deplorable condition, and place all the blame upon our servants, the supervisors.)

Yet, as farmers, we are not altogether to blame for the bad condition of our country roads (as our city cousins would have us believe,) we, like other men, have had other great interests and responsibilities to meet all along the line, and from the days of the dumping of the tea into the briny deep until the present, the yeomanry of this great republic have borne their full share of all the responsibilities and duties belonging to the loyal citizen, and have helped to give this nation not only the highest civilization, but the best government upon which the sun has ever shown. And now let us turn our attention to the needs of the hour and help on the agitation of this road question, and help educate our people up to this much-needed reform. For our people never fail when the light is turned on, and their duty made plain.

Now this brings me to the answer of your first question, namely—the payment of road taxes in money instead of work. From past experience, I would say always in money, instead of work, and should never be allowed to pay in work—as under the present system the supervisor can accomplish very little by giving work to a lot of taxpayers who expect to do a half day's work at home and then be allowed a full day

on the road, and not half work at that, except it be on a piece of road adjoining his own property, so that under the present system the supervisor's hands are almost completely tied, for with the taxpayers to deal with, and dictate to him, he is completely in their hands and feels and knows that if he honestly does his duty to his township and the roads he will be very likely to lose his head at the next election, and some one more pliable be elected to take his place, so he shrinks from duty and does not accomplish one-half for the good of the roads and township that he otherwise might, had all the money been placed in his hands due, and he been left free to hire such help as would have been most suitable for the work to be done. If the present system is to be continued, not only should that part of the road laws be repealed, but they should be so repealed as to fix the term of the supervisor at not less than three years, instead of one as now, for no supervisor can do justice to the roads of his township when he is obliged to feel that his term is but for one year, and his successor may undo the next year what he had planned and commenced as a real improvement to the roads of his district. So with the present law repealed, requiring all road taxes to be paid in money and making the supervisor's term not less than three years, I think I see how much more might be done to improve our roads than at present.

Then I would suggest that not only should every township or road district own its road scraper, plow, roller and what other tools may be needed, but should own its steam stone crusher as well to be located as near the center of the district as possible, at some good stone quarry, where stone could be cheaply had and crushed for the repairs or building of the roads. These machines should be run at a given price per perch, winter and summer, preparing the material for the repairs of the roads, which could again be hauled by the perch to the points or places most needed under the direction of the supervisor.

In most townships there are more or less quarries always open near or at the roads, whose owners would be only to glad to lease them to the districts or townships, and at a nominal sum. In other townships, quarries might easily be opened in some good locality and at convenient points on the line of some roads, where stone could be cheaply had for the crusher, and when too far to haul from a given point or locality. The machinery could be easily moved to another locality, nearer to where the stone may be needed, so that after a few years of this steady constant work, the roads would not only be greatly improved, but many miles would be permanently macadamized, and as each township and county did its duty in this line, constantly using new and improved methods as we advise, I fancy not many years hence our fondest hopes of having fine roads will begin to be realized, and future generations will rise up and call us blessed. And now, for the question of taxing all kinds of property for road purposes. I am aware that the first cost of good roads is so great that no ordinary agricultural township or district could or can bear the burden in a single year, or in five or ten years, of placing their roads in the condition they should be, without greatly increasing the burden of the already over-taxed farmer; and in the present depressed condition of agriculture I would not recommend any measure that would add directly or indirectly to the burdens of this struggling class of our people, who for years have been taxed far beyond any other class of our citizens, and often far beyond their ability to pay. But the question arises, can there not be some plan devised by which a revenue, small though it may be, can be placed in

the hands of our town authorities, to be used as best it can to put our roads in the best possible condition, and to make all repairs as permanent as possible.

Why not give to the townships all the revenues collected from hotel licenses and all other licenses, for road purposes, after the expenses of collection has been paid? Why not enforce the dog law and give us all the money from that source? And then be careful to tax all property for road purposes that is taxed for any other purpose. For the benefit derived by property lying in the localities of good roads is shared equally by all, and all should help bear the burdens, if it be such.

The extension of state aid for the permanent improvement of township roads, is a question needing careful thought and study, and one which our legislators will soon have to meet and solve, but if in the near future a just and equitable law could be framed giving directly to the townships for road purposes a sum of money, the equal of which must be raised by the township to be applied for the same purposes, in addition to its regular road tax, a stimulus might thus be given the township to do much more for their roads than they otherwise would do in order to secure and use the state's money. No doubt a law of this kind would be productive of much good, and result in much permanent improvement to the public roads of the state. But any law, looking toward the creation of a long list of salaried office holders, in whose hands vast sums of the people's money would melt away, long before it came near them, like snow in an April shower, would be looked upon with distrust, and would defeat the very end for which it was created. So that whatever may be done in the line of state aid, to improve our public roads, should not only be done with great care, but a line that will win the entire confidence of the people who pay the taxes.

The aim of all should be to reduce taxation and not increase it; if possible, to avoid it.

In regard to State aid, the people are not fully prepared, I think, to give a decided expression on this subject. If such a law was passed it is a question in my mind whether, on the whole, we would be benefited. May it not be quite as well to let each township in the state pay its own road taxes? I think the people of the township in which they live should pay for their roadmaking themselves, and not depend on state aid. I am quite sure that in the end roadmaking will cost less over the state, and in this way is not so likely that public moneys will be so easily misapplied, as is often the case when appropriations are made for public use.

JOHN J. MOORE, Bucks county. Let a board of five or six supervisors have charge of each township, with power and authority to call upon the taxpayers of each sub-district to work upon the roads themselves, or furnish a substitute, at any time they shall be called upon. The remuneration therefor to be deducted from their taxes.

In favor of taxation of all kinds of property.

No, it cannot be satisfactorily applied throughout the state, and what is permanent improvement? We have nineteen and three-fourths miles of stoned turnpike roads leading out of our borough under the care of five different boards of managers. The cost of repairs for material and labor alone for the year 1888 was \$154.30 per mile, and that was about the average cost per mile each year.

Only such future legislation as will substitute a board of managers, elected by each township, with power to divide it into sub-districts,

they acting as a unit in the general supervision, but individually in regard to keeping his own sub-district in repair.

F. M. McKEEHAN, Perry county. 1. The payment of road tax in money instead of work. We answer unhesitatingly in money. If the half of the taxes levied were paid in money and expended with any degree of scientific or practical knowledge, as to the construction and repair of our roads, they would be passibly good the year round.

When paid in work, comparatively few do an honest day's work. Those who would, are interfered with by others in conversations, etc.

For many person go to pay taxes, and the numbers often are too large for one man to oversee; too much time is lost in the great distance that supervisors skim over the roads. Too many feel no interest in the repairs, except upon the roads they are necessitate to use; hence in many places little things of great importance are treated with great indifference, never thinking that large leaks announce themselves, but the result is just the same by small ones. If taxes were paid in money, we would all want to see an equivalent; hence a greater watchfulness as to the proper expenditure. The first important thing is proper drainage. No water should be permitted to stand along the roadside, but carried away at the first opportunity. No canal on either side to endanger life or limb. It should be lawful for the supervisor to employ persons by the year on certain portions of the road to keep open side and cross (or breakers) drains after the road has been put in repair. More intelligent supervisors will give us better roads; and if the working system is abolished, the inducement will be destroyed for the masses to vote for the man who will make an easy supervisor, and thus intelligence, worth and responsibility will be sought; and that can be had by electing only one man at one dollar and seventy-five cents per day, and not two dollars and fifty cents or three dollars as contended for by some.

2. The taxation of all classes of property for road purposes. We answer by asking, why not? Is real estate the only species of property that is benefited by public thoroughfares? Is not the value of all personal property benefited? Are not all associations for profit, incorporations, dealers, professions, etc., interested? If so, why should they not bear a part of the expense? Governor Abbett, of New Jersey, in his inaugural called attention to the great railway and canal corporations worth \$70,000,000 escaping local taxation. How many millions in our State pay no local taxes?

3. Extension of state aid for the *permanent* improvements of township roads. Answer that the state ought to contribute. We are not ignorant of the very many difficulties that are to be encountered in the appropriation. If our revenue laws were as they ought to be, the state could and should appropriate as much for roads as they now do for schools. Roads should be classified and considered under two heads, as state and county. The law specifying what shall constitute each class, leaving it to the courts to determine and designate the roads. The main-thoroughfares leading from county to county or to important places, to be considered state roads, etc. The state paying a certain amount to each permanent improvement upon said roads, perhaps in proportion to the mill value expended by the township on the same, upon the principle that he who helps himself, will be helped. Not upon the principle advocated by some, *i. e.* in proportion to the amount of state taxes paid; this would make the rich richer and the poor poorer. Or on a percentage to the miles of roads in the township, and not in pro-

portion to the taxables in a township, as in many townships there are towns located in the township.

The state legislates eminent domain to an incorporation, not simply as a corporation, but for the public good, and often makes large and extravagant appropriations to objects more or less worthy as the case may be. Certainly there should be no question about appropriating to roads where ALL have the advantages and equal rights.

R. S. SEARLE, Susquehanna county. The subject of public roads and highways, and how to best build and improve them, has engaged the earnest and thoughtful consideration of the State Board of Agriculture of Pennsylvania almost from its first organization to the present time. There have been but few meetings of the Board at which the subject has not been discussed; and the present agitation of the public mind in regard to roads is very largely due to the action of the board. Until now, detailed methods are to be considered with the view of formulating a new road law to supersede our many and diverse laws that do not, in practice, produce the desired result in good roads, at the least cost for construction and maintenance. The present system of road tax is based on the principle of personal service, or working out on the road the tax levied, and is a relic of the old feudalism borrowed from the statute law of England; and its results to-day are apparent in the condition of the roads all over the state; and, if continued, will be an effectual bar to any improvement in almost all sections of the country. Then how shall the necessary means be raised to do the work? The State Board of Agriculture, after careful consideration of the subject, have almost unanimously decided that the tax levied for road purposes should be a cash tax, and this has been the expression of these attending our numerous farmers' institutes held in all parts of the state. There are some who oppose this view, but the large majority are in favor of it. The argument of those who oppose a cash tax is, that they have already more cash tax to pay than they want, etc. But when it is clearly demonstrated that one dollar in cash will make more and better roads than two dollars will, worked out in the old way, their opposition will cease. The present system of viewing, laying out, building, and paying of damages as practiced in most of the counties of the state, is, in my opinion, more objectionable than the manner of working out the road tax is, and demands an entire and radical revision. Let any taxpayer carefully go over the county statement of expenditures, and he will at once see that a very large amount of the cash tax for county purposes is used in road views, damages, court expenses, etc., to say nothing of the extra or special road taxes to pay for opening new roads, etc. In our county of Susquehanna over \$11,000, in a levy of about \$30,000, was expended in bridges (which are only parts of a road), road views and damages, or over one-third the county tax. This part of the subject, on examination, develops so much that is wrong, burdensome, and unequal, that even a superficial glance at it will convince any one of the absolute necessity of an entire and complete revision of the road laws in regard to it, and we do not doubt that the able men on the road commission will so recommend.

Another question or consideration in connection with the subject of roads, will be, shall the roads be an entire charge upon the real estate and personal property of real estate owners as at present, or shall all the property of all kinds in the state pay its share of the expense? Or, in other words, shall the state aid in this greatly-to-be desired improvement? I know that there is a difference of opinion on this

point, but I cannot see why it is not just and right that the state should largely assist in improving our roads. The idea is not new or without precedent. In the earlier history of our state large sums were appropriated to assist in building roads all over the state, in order to open up and render inhabitable the vast regions which are now productive farms and happy homes, and who shall say this money was not well spent, or that the money so appropriated was wrong or injudicious? The state later spent many millions in what was known as internal improvements, and although it is now thought by many, in view of the fact that those vast waterways are rendered useless by modern improvements, that the money was wasted or, worse, thrown away. I do not believe this is true. Those improvements developed the hidden wealth of the state, and demonstrated the practicability of better means of transportation, which has led to those magnificent highways of commerce and travel that far transcend the utmost efforts of the most powerful nations of the past, and whose yearly incomes are in the aggregate many times the entire sum spent by the state, and whose annual net income far exceeds the interest on their cost. As these great arteries, veins of commerce, are only, with the common roads, the avenues by which the products of the farms and mines and forests are to be moved to those who must have them, and it is admitted by all that the present condition of our common roads are a great obstacle to the successful tilling of the soil and marketing of the products. Why may we not ask the state to appropriate a large amount to assist the counties in this work.

There is a bill now before the legislature of New York appropriating \$10,000,000 to assist in improving the common roads of the state. If it is a proper thing for New York to do, why is it not also proper for Pennsylvania to do the same?

G. HIESTER, Dauphin county. *First.* All road tax should be payable in cash.

Second. All classes of property should be taxed for road purposes.

Third. On the subject of state aid for permanent improvement, I am not so clear. There are so many obstacles in the way of its economical application, and so many opportunities offered for jobbery, that I think it would be better for each county to take care of its own roads.

If the state were to provide the means for permanently improving the roads, the first question to arise would be as to the basis upon which the appropriation should be made to each county and each township, and on this question it would be difficult for the counties to agree.

No matter what system is adopted for the management of this fund, a state superintendent, who should be an engineer of experience, must be appointed, and he in turn must have an assistant in each county (also an experienced engineer) who shall have immediate supervision of the construction of all roads receiving state aid.

This would give us, to start with, an army of at least eighty high-priced men to oversee the expenditure of the appropriation.

We have no reason for supposing that they would be more faithful or skilful in the performance of their work than others have been in the past, and, judging the future by the past, I am constrained to believe that the benefit to be derived by the state at large will not be in any degree commensurate with the enormous expense that must be incurred if the state is called upon to help each township to build even a few miles of road each year.

J. P. BARNES, Lehigh county. This question of good roads has been and is now agitated throughout the state. I hope it will not end in talk only, but that some feasible plan will be arrived at to give us more uniform and better roads all over the state. It is certainly desirable and much needed. It will save both horses and wagons and benefit man to a remarkable degree.

To have good roads it is necessary that our legislative bodies frame and pass some general act, which shall provide and direct how our roads shall be constructed and maintained in a good condition for travel. The road bed should be constructed so as to prevent our winter frosts and spring rains and thaws from wearing and softening them to the depth of one foot or more, whereby they become almost impassable.

Should said act not provide a limited pro rata to each county or township according to needs of its soil and population, authorize the election or appointment of a competent engineer to direct the construction and repairs of all the public roads throughout the entire state, having under him county and township supervisors to carry out the details required for good roads?

All road taxes should be paid in money instead as it now is, to be worked out on the road repairs which has been and now is the custom. This would give cheaper and better roads. To have permanent good roads, the only plan would be to in a measure grade them and adopt the Telford road bed, which is cheaper than the macadam plan and would answer all purposes. Our public roads now are intended to be in width thirty-three feet; it would not be necessary to construct the road bed more than fifteen feet in width, which would give ample room for two vehicles to pass each other. I sincerely hope that some good results will come out of this road agitation; there certainly is improvement demanded and needed, all will admit.

D. P. FORNEY, Adams county *First.* Road taxes should be paid in money. This is so obvious that it needs little comment. The road supervisor with one or two hands and a horse and cart should be employed the whole year around on repairs, just as the repairmen on a railroad are employed. They could thus work according to the teachings of the economic proverb that "a stitch in time saves nine."

Second. All property should be taxed for road purposes as well as for every other purpose for which taxes are required. We ought by this time, to have learned to our entire satisfaction, in this commonwealth, that when once discrimination in taxation or legislation is begun, there is no end to injustice. All men and all property are benefited by good roads, hence all ought to help to pay for them.

Third. Your third proposition is very difficult of solution. Thus far we learned with emphasis that we never have good roads when they are under local control. Hence the only other plan left is to try state supervision and construction. This conclusion is fortified by the fact that in all European countries, where good roads prevail, they are under state control; unless the power to construct and maintain good roads is removed farther from the average voter than it now is, it is safe to say we will never have good roads. In all clay soils there is but one way of making a good road and that is by macadamizing or piking. This is expensive, and if a road supervisor is elected, who has energy enough to begin doing this intelligently, he is straightway removed at the next election, because the taxes are too high. The people themselves will never make good roads as long as they feel and see the direct taxation for the purpose, hence it must be removed from their

immediate sight. Meanwhile some things might be done which would be helpful in the matter. European governments put their idle and restless population to work on public improvements. Why should not we do this? We are tolerating a system of vagabondage in this state which is a disgrace to us. The average tramp is a public enemy, and will usually commit crimes when he has the opportunity. Against him the farmer is almost entirely unprotected. His home, his property and the life of himself and family are all largely at his mercy, and when this enemy is arrested for crime, he is too often discharged upon his promise to leave the county. That is, to go into a neighboring county and commit crime there. Just how much better we are off in this respect than are the inhabitants of some African kingdom, who are always at the mercy of any predatory neighbor who sees fit to attack him, is not so easy to see. Verily, our roads fairly gauge our civilization.

Now, why can we not have such legislation as will put these men to work on our public roads. The farmers of the state feed, lodge and to a large extent cloth them, and they have a right to demand some service in return, and the state ought in justice to compel it. A just state government ought not to permit a tramp within its borders without putting him to work.

Hon. A. O. HIESTER, Dauphin county. I favor the payment of road taxes in money instead of work.

I have often noticed half a dozen of men and boys with teams and plow, not doing half a day's work, and not doing it at the proper season, and not doing it with judgment. The township supervisor cannot complain, as his office is dependent upon the good will of his employes.

To the second question I answer I am in favor of the taxation of all classes of property for road purposes. All classes of citizens are equally interested in having good roads. Many estates consist more largely of personal property than real; it is but fair that each should contribute to the enjoyment and safety of good roads.

To the third question, I am not in favor of state aid to the improvement of township roads. It would be but the entering wedge to the expenditure of millions of dollars, that in the end would have to be repaid into the state treasury by the taxpayer, as was the case with canal, and railroads.

OLIVER D. SCHOCK, Berks county. 1. The question of the payment of road tax in money instead of in labor. This is of the utmost importance in this era of bad and almost impassable roads, when there is a loud demand for improved roadmaking machinery, and a more intelligent system of repairing the highways. What is most essential is a change in the present road laws, and special efforts should then follow to elect efficient and morally courageous supervisors who will perform their duties in an intelligent, faithful and unselfish manner. The interests of the people would be best served if the cash system were adopted which experience teaches us is always preferable in private or individual transactions. The suggested change would empower those in authority to employ only such persons who are willing and physically able to perform an average day's labor. Simple justice to his constituents would demand that the other class should be ignored, although in the majority at present in many districts. It would be far better to make this distinction and exonerate the aged and indigent rather than continue the present system.

2. The taxation of all kinds of property for road puposes is a prop-

osition that is not in accord with the general public sentiment of this community. Those who would perhaps be the most benefited are opposed to the measure, mainly because of a vague or indefinite understanding of the theory, and because they fear that the increased income might not be economically expended and properly applied. It is conceded that some additions to the list of taxable property for road purposes might be made with propriety.

3. Any law that will aid in devising available means by which the highways may be improved in a permanent manner will be hailed with genuine satisfaction. There are many who favor macadamized roads, provided that the state would grant an appropriation for a proportionate share of the cost. This is intended to apply only to those main highways which are commonly designated as "State roads." The proposition is, that the appropriation in question should be made in a manner similar to that governing the school fund of this commonwealth. The general consensus of opinion is that in these thickly settled counties of eastern Pennsylvania the extension of state aid is hardly feasible or necessary.

JOHN G. CLARK, Washington county. In our county (Washington) we have a heavy limestone clay soil, good for production, but the worst kind of material for roadmaking. Nature has furnished abundance of limestone for macadamizing, but there is a great deal of labor and cost in securing a firm road-bed. We have two systems of making and repairing our township roads. The plan of letting the farmers work out their taxes under supervisors is the oldest and most general plan.

In some townships, commissioners are elected and the roads divided into sections, and sold out to the lowest bidder for keeping in order for a term of years. In this case taxes are paid in money. Both plans seem to work very well where the officers in charge faithfully perform their duties.

This brings us to the first topic mentioned in your circular; should road taxes be paid in money instead of work? I think it would be an advantage, more because in working out taxes it has become a habit to get off as easy as possible, and in many cases old tools and teams are raised which make it impossible for the laborer to give a full and fair day's work. In discussing this point at our farmers' institute in Washington, Pennsylvania, about a year ago, I made this remark, "the habit of shirking and dodging the work has been practiced so long, the disposition now descends by *heredita* from father to son until it is impossible to get fair and honest work done." I think there is a great deal of truth in this. The boys are put on the roads very young and are taught by both precept and example to do as little as possible and deceive the supervisors as far as possible, and neither the roads nor the boys are much benefited. There are numerable exceptions, but this is too common. I therefore conclude that it would be better that road taxes be paid in money.

2. "Should all classes of property be taxed for road purposes?" I would say certainly it should. There has been no greater blunder in the past than to suppose the farmers should keep up the township roads. All classes of citizens are interested, and one almost as much as another. It is true the farmer must have a road of some kind to get his products to market, but the purchaser is about as much interested as the seller. It would be very difficult indeed to equalize taxation in such a way that each one would get full benefit, in the use of roads, for taxes paid. But many citizens of towns and boroughs make more use

of township roads than the residents of the townships. Some men or firms, doing business in our towns, have teams on the roads almost every day in the year, while some farmers, especially stock-raisers, would not average one day each week. And the same is true in pleasuring as business. I could illustrate by my own case, and there are hundreds of similar cases. I live on a farm intersected by a macadamized road. All of my produce goes to market over this turnpike, and nearly all of my travel, either for business or pleasure, is on this road, and on which I pay toll for every mile traveled.

And at the same time pay a yearly tax of from forty to sixty dollars for the improvement of other roads which I use very little. Perhaps not one-tenth as much as some others who pay nothing toward the road funds. Would not justice require that those who use the roads *should* be taxed for their improvement?

3. In regard to the extension of state aid in the improvement of township roads, moneys appropriated in this way, if properly expended would certainly do a great deal for the permanent advancement of the State. But there would be difficulties in the distribution which would be hard to overcome, and I will leave this question to others. But something should be done to encourage the making of permanent roads throughout the state. Millions of dollars have been expended in making road-beds of clay, and although it has been going on for about a century, we are almost where our fathers began. As our population increases the travel on our roads will increase, and it becomes more and more necessary that our road be made more substantial. This of course will require the outlay of more money, and until the people are willing to expend more, we cannot have good roads. I believe all the permanent roads of the state have been constructed by incorporated companies, and perhaps this is the most practical way to secure our object. I know there is a great dislike to toll-gates, and a disposition to vote them out of existence. But can there be any way devised that will put the cost of repairs so fairly on those who receive the advantages of the road? There are but few roads, if any, that will pay dividend to the stockholders. But it will pay the property holders in almost any community to form an association and secure a charter for maintaining a road and erecting gates thereon. Not for the purpose of receiving dividends on their investment, but to secure the advantages of a first class-road. I have had some experience in this line, having been president of such a road company for seventeen years. Our board of managers are all personally interested in maintaining and improving the road, and only receive a nominal sum as compensation for their services. We are putting two hundred perches of broken limestone on each mile yearly, and there is a marked improvement on the road each year, and it must become a first-class road. We have never received dividends, nor never expect any, and yet every man feels well paid for his investment. I believe the same thing can be done in hundreds of cases.

H. M. ENGLE, Lancaster county. That a change is needed toward the improvement of our public roads, is no longer a mooted question, even among those who pay the road taxes at present, but their views on the methods vary greatly. Many favor better roads without additional expenses, which may be possible to a certain extent; but real estate owners claim that they are already over-taxed proportionately with their income; farmers especially hold out this plea, and with good reason.

However we live in an age of progress, requiring more comforts than were allotted to our forefathers, and comfortable roads are not the least within reach.

No doubt there is room for better methods in common roadmaking, but without stoning, on the McAdam or Telford system, or both, of certain portions at least of the public roads, they will not, and can not be made to satisfy the demands of our progressive age; or I might say the progressive portion of the population of this age, for upon this class improvements of all descriptions will depend. Time is too precious to wait until laggards get out of the old ruts and consequently they must be helped out. Too many cling to the antiquated notion of our present law, that they must have the privilege of working out their road tax, and the law should at once be repealed, and none but able and well qualified workmen be employed, which would in the end be a benefit, even pecuniarily, to those who insist upon working out their road taxes, as any farmer whose attention, and the labor of his employes, is not worth more on his farm than on the road at the time roads should be repaired, has mistaken his calling.

Public sentiment among the rural population has become deeply rooted, that all classes of property should be taxed equally including for road purposes, and legislators who ignore this sentiment will some day find themselves left.

In order to facilitate the necessary improvements in the public roads, state aid should be granted to the townships on certain conditions.

- (1) That the appropriations shall be for stone roads only, which must be made on the most improved methods consistent with economy.

- (2) That a competent person shall be elected by each county under whose directions the supervisors of public roads in their respective townships shall construct the said roads.

- (3) That the state appropriations shall not exceed a certain amount for each township annually, for a term of years.

A law embracing at least some of these principles would not fail to induce some townships to improve road building, which would be followed by others until every township in the state would avail itself of the benefits of the laws, as has been the case with our common school law. That such a road law as I have sketched would meet with opposition similar to that which our common school law met with, but like the latter, once the entire state shall be provided with good roads, coming generations will bless those who inaugurated the improvement.

S. E. NIVEN, Chester county. The question of improving the manner of repairing the public roads is one that is receiving deserved attention. Possibly we may gain something by considering the defects in the present system. In this township (London Britain, Chester county) the repairing of the roads is sold in sections to the lowest bidder for a term of five years. We find that men who are honest and conscientious in dealing, men who would not wrong a neighbor out of a penny even though there was no written agreement or no witnesses to their bargains, yet these same men will sign a contract with the supervisors which they do not attempt to fulfil. Of course it is the duty of the supervisors to see that each section is kept in repair according to the contract, but we have never been able to elect men who were willing to quarrel with their neighbors, which would be the certain result if these officers did their duty. A supervisor who would attempt to compel even the partial fulfilment of these contracts, would soon have many enemies, and would serve but one term, as he could not possibly

be reelected. We pay each year more than enough money to have good, and have very bad roads.

It was suggested at the farmers' institute at Oxford that the farmers should keep in repair the roads passing through their farms in lieu of road tax. It was claimed for this plan that each farmer has teams and laborers, that he would take pride in having good roads through his land, that he uses such roads most frequently, and would have a constant supervision over them, that such repairs should be in lieu of road tax would probably not be just, as I find I paid last week \$105.28 road tax, and received for agreeing to keep in repair all the roads passing through the land in which this tax was levied, \$46.40. We have paid for each of the last five years for repairing roads, \$727.04, or a total of \$3,635.20, and there is at this date nothing to show for this outlay. These years were but a repetition of those that preceded them, and an enormous amount of money has been expended without any permanent improvement.

Repeal the law authorizing the selling of the repairing public roads. Elect one supervisor, and chose him as you would select a man to transact other business for you. Do not inquire what political party he favors or who he voted for for additional law judge, have no regard for his views on the tariff, but elect the one man of all others in the township who is best qualified for the position, and who will do his whole duty, without fear or favor.

As this township is very small, a supervisor at one dollar and one-half and two laborers at one dollar and one-quarter each, or four dollars a day for seventy-five days, with all the best implements and machinery furnished them, and with a team at the same cost, would put our roads in good repair for \$6,000, then we would have left of our present outlay \$127.04 for supervision and occasional repairs during the remainder of the year. In larger townships the supervisor should have enough men to keep the roads in repair by being constantly employed on them.

Collect double the present amount of road tax and expend the surplus in permanent improvements. As the roads are thus gradually improved the expenditure for repairs will be correspondingly lessened.

Repeal the law compelling the supervisor to notify men to work on the roads and collect the tax in money. We have old men who are assessed for road tax thirteen cents. If the supervisors employ them they pay each one dollar and one-quarter for one day. Consequently they pay no taxes it is economy to exonerate them.

The question of a just equalization of taxes is a very difficult one, yet they should be so adjusted that all classes of property will bear a fair proportion of the burden of taxation.

The State should aid in the permanent improvement of township roads but not by an appropriation from the state treasury. The county treasurer should not collect taxes and pay to a state Treasurer, and he pay a portion of it to the supervisors. We are now receiving this kind of state aid for the support of our schools. We pay state taxes on or before September 1, in each year, and more than a year after a part of this money is paid to the treasurer of our school board. The last legislature made an extra appropriation for the support of the public schools which was approved May 20, 1889, but the money has not yet reached the townships. Let the state pay its necessary expenses from revenue from other sources and allow each township to keep the taxes now collected from its citizens and paid into the state treasury.

I. F. CHANDLER, Chester county. The payment of road taxes in

money will be right whenever you tax all classes of property for that purpose, which I think should be done and would be right and equitable as was intended by our constitution, but under the present road law, defective in many points as it is, I think that the payment at least of part of the road tax in work, is a relief to a greater part of our farmers, as it seems to be that the greater part of the road tax comes off the farmer. If the continuance of the present laws are to be the same as in the past, I would favor a law allowing the road tax to be paid by the corporate and personal property, and by this way relieve the owners of real estate from the payment of any road tax. In this case aid from the state might be of value in the improvement of our public roads.

The chief defect in our present law is the finding of a man suitable for the office and the pay of such a man. If you have a man capable of filling the office, the pay is insufficient to recompense him for the time and trouble, to say nothing of the illwill and abuse of his neighbors. I think the foregoing will be enough to inform them that we need a system or law that will enable the counties of the state to build a permanent highway not only fit for summer use, but for the convenience of travel in the winter season.

A. C. Sisson, Lackawanna county. There are certain self-evident facts and conclusions that present themselves to all who have given the subject careful consideration, among which are the following:

First. A general revision or repeal of all the road laws of this state.

Second. The payment of all taxes for road purposes in money instead of labor.

Third. The taxation of all classes of property for road purposes.

Fourth. State aid is necessary for the permanent improvement of township roads, which should be paid to each road district as a premium for the construction of each mile of road or fractional part thereof over one mile and not over five miles in any one year; said road to be made according to plans and specifications which shall be established by law; said premium to be at a uniform rate throughout the state, payment to be made whenever said road shall have been inspected and approved by the county commissioners of the county where said road shall have been made.

Fifth. Some material other than the common soil is absolutely necessary for the making of permanent roads.

Sixth. A macadam road varying in width and thickness according to circumstances the most practical of any in use.

Seventh. There should be one road commissioner elected in each road district at the February election of each year who shall serve one year, and have a salary of three dollars per day, for every day in actual service, and shall give good and sufficient bond for the faithful performance of all the duties required by the office.

Eighth. Any law that contemplates an increase of salaried officers, we believe would be inimical to the best interests of the taxpayers of this Commonwealth.

Ninth. Each road district should decide at the February election how much road should be built each year, and locate the same by a majority vote.

Tenth. The premium to be paid by the state should be equal to one-half the actual cost of road made.

J. B. PHELPS, Crawford county. To the first question I answer, I am in favor of road tax being paid in money, with the privilege of the

taxables along the road having the first chance of working out their tax under the command of a general superintendent or road master appointed or elected in each town, said taxables to be allowed the same wages and to do the same amount of work as other laborers, and to work when called upon by the road master, or pay the money. My reasons for this, is to get a uniformity of roads in each township on a certain system under the direction of a skilled road master who knows what he wants and will have it if given the power. The reason for allowing the taxables along the road the privilege of working out their tax is, it is possible and quite probable, that many have not the money to pay their tax unless putting them to distress, but they have plenty of brawn and muscle that they can use to advantage, but they should be forced to work under the direction of the road master.

Second question. The taxation of all classes of property for road purposes. I answer emphatically yes. All property should be taxed, not only for roads, but for all the taxes. My reason for this is brief. On the true and broad principles of justice and equality, as long as property is a basis for taxation, why not let property, all property, pay an equal tax? It seems to me that comment on this question is unnecessary to the unselfish, and the selfish should be forced to pay their just dues.

Third. The extension of state aid for the permanent improvement of township roads. This I suppose means macadam roads as permanent improvements. This question I am not as decided upon as I am on the two former questions. I think it depends much on what our revenues are and from what source they arrive. Under our present system of taxation I should be in favor of the taxes from corporations, etc., be increased to a par with farm property, and then the state appropriate such funds as it could spare to each township (similar as the school appropriations now is) for permanent improvements on public roads. And that every township in the state should decide what those improvements should be, macadamized or otherwise. I am not in favor, by any means, of making a law compelling every township in the state to make a macadam road, such a law would be unjust, as the most of the townships of Erie and Crawford and Mercer have not the material nor is it available. But the towns where the stone are available and the travel is great, macadam roads would be the cheapest but this, I insist, should be left to the township.

It appears to me under existing circumstances a word of caution might be appropriate. We have had the past year an unprecedented season. A season that could not be surpassed for mudmaking, and in all probability the like we will not see again for some time. Therefore, we should go slow how we legislate, or under the impulse of the moment we may heap upon ourselves a debt that this generation will never see extinguished. 'Tis a mooted question with me whether any macadam road would pay, under any circumstances, in Crawford county; I am sure it is not favored by one-eighth of its inhabitants. But we want better roads, and a law based upon the views I have expressed, I believe, will make them.

J. S. WILLIAMS, Bucks county. 1. All taxes, including those for road purposes, should be paid in money, thus leaving the road superintendents at liberty to employ the best help in the labor market on the best terms.

2. I favor the taxation of all kinds of property for local purposes, and

for that matter, all purposes, if necessary. It seems to me unjust that land, when assessed at its full market value as it now is, should pay from ten to fifteen mills tax while the mortgages secured on it should only pay three mills. I favor taxing the owner of land for *only* what *he owns*, that is, deducting all registered liens thereon from the assessed value of the land, and requiring the owner of those liens pay the taxes; as it now is a farmer owning land valued at \$10,000 pays from one to one hundred and fifty dollars tax thereon; while his neighbor, whose money is differently invested, pays but thirty dollars on the same valuation, receiving at the same time equal benefit from the roads, schools, etc. The case is doubly aggravating when a part of his money is invested in his neighbor's farm for which the neighbor pays all the taxes—except the three mill state tax.

3. Should taxation be equalized there would be but little need for state aid for road purposes. Should state aid come to benefit the roads, I think it should be applied to a few of the leading roads of each county which should be made and repaired entirely by the state. I should not approve of putting township affairs in charge of state officers.

So far as legislation is concerned, that upon taxation, which seems to be the most important, "is answered in reply to questions 1 and 2."

I would approve of a law making it obligatory upon each township to thoroughly stone or gravel a certain percentage of the mileage of the roads in each township not exceeding two per cent. each year as long as needed. When townships are divided in two sections, the road improved thus should be equally divided between each section.

I think it would be well to have a law authorizing supervisors to buy, lease or take (as lands for school purposes are taken) land for road improvement, which may contain stone or gravel of good quality for making or mending roads. A local turnpike company bought, many years ago, three acres of land containing a gravel bank for less than two hundred dollars, which has been worth more than that amount to the company every year since for the gravel used.

I do not think it would be advisable or practicable to have all or near all our own roads turnpiked. A few of the most used roads with bad sections in others, would probably be more satisfactory than to attempt too much. Turnpikes are expensive to construct and to keep in repair, while a turnpike out of repair is a nuisance, a bad road all the year, while a good dirt road is preferable to most turnpikes nine months in each year.

My feelings would, therefore, be to work cautiously but thoroughly, and not expend more than can be raised by a fair rate of taxation, or can be adjusted valuation of taxable property. I am decidedly opposed to raising large amounts of money by borrowing and thus place a permanent burthen of debt on the townships which I can see no way cancelling.

Hon. G. D. STITZEL, Berks county. 1. I am opposed to the working out of the road taxes followed in so many districts in this county, as well as in other counties in the state. I do not believe in the policy of doing work on the "pic-nic" plan, unless those engaging in it give their services gratuitously, as is often done in farming districts where the farmers will have "stone matches," for instance, on their premises, for the purpose of clearing a piece of land, and then celebrate the occasion by inviting the neighbors and friends who have assembled to partake liberally of refreshments. All work done on the public roads

should be paid in cash, upon the principle of a full day's pay for a full day's work.

2. I believe in the taxation of all classes of property for road purposes. The farmers are already sufficiently taxed, and their burdens should not be increased.

3. I am heartily in favor of the extension of state aid for the permanent improvement of township roads. There is a much stronger argument for the state assisting in the maintaining of roads than for the maintaining of schools, for the reason that the roads are the property of the commonwealth, opened, repaired and kept in condition for all the citizens of the commonwealth, at all times, while the schools are only for the education of the people of the district. The state should extend assistance in this direction. One trouble with country roads is, that there are too many of them. Nearly one-half of them might be vacated to the advantage of public travel. I have no suggestions to make as to the manner in which the state aid should be applied, but no plan will meet with favor which will tend to increase the road taxes of the farmers.

JOHN McDOWELL, Washington county. *First.* I am in favor of road taxes being paid in money.

Second. I am in favor of all classes of property being taxed for road purposes.

Third. I am decidedly in favor of state aid for road purposes, to be applied only to the main or leading township roads.

In addition, I suggest the following: That all teamsters who haul into or through townships, be required to pay a license in each and every township through which they haul or drive.

My reasons for this is, that many teamsters from other states have been hauling for years over our roads. As many as sixteen heavy teams from Ohio and more than this number from West Virginia, have been hauling every day in our townships, and many on the Sabbath, thus destroying our roads and bridges and pay no toll nor tax whatever. Cities and towns require teamsters to take out license. Townships should do the same.

There should be a practical civil engineer to be appointed by the court of quarter sessions, to hold his office for a term of three years, his compensation two dollars and fifty cents a day, to be paid out of the county treasury, his duty shall be to oversee all work and have the roads repaired on the grade of original survey or plot and have all roads opened to thirty-three feet. All side drains, culverts and water ways to be kept open and in good repair. All road beds to be kept smooth and rounded up in center. All state aid and part township tax to be used in macadamizing soft or marshy places, and to continue year and yearly to stone the road bed as far as funds will admit. He must settle his account with the auditors.

Supervisors to be elected by the people each year. Their duty should be to levy the tax on duplicates furnished by county commissioners. They shall be under the direction of the civil engineer, and do all work as he directs. They shall employ labor and teams and continue the work from day to day, as the engineer may direct, reserving a part of the funds for repairs needed, caused by floods, rains or washouts; they shall employ a full force of hands so as to speed the work, and in order to keep the office out of politics their compensation shall each be one dollar and fifty cents a day, and they shall be owners of real estate in the township where they survey.

They shall keep a daily account of all work where and when done, and the cost of all work and material used, and make settlement with the township auditor.

The treasurer should be elected by the people for a term of two years. He should give bond for double the amount of the tax duplicate. He should collect all taxes and draw the amount appropriated by the state, and pay out the same upon order of the engineer to the supervisors, and he should allow a rebate on all taxes paid at his office on or before the first Saturday of May each year. On all taxes not paid by the first of August, a penalty of five per cent. attaches, and there after a monthly additional penalty of five per cent. attaches, and ten per cent. for collecting by law and costs of suit, to be commenced the first Monday of December.

The treasurer should settle his account with the auditors and should publish a statement of items in one county paper near to their township. Where damages are claimed against the township, the engineer should examine all cases, and if he finds the accident happened off the traveled part of the road, the township shall not be held liable; the traveling public must take all risks when the horse or vehicle leaves the traveled part of the road. Where accidents occur and the engineer finds by actual measurement the road at the place of the accident is less than thirty-three feet wide, the party damaged may recover by suit from the land owner whose fence encroaches upon the bounds of the road.

All persons who obstruct the road by wood piles, implements, or feeding of stock, shall be held liable to damages.

The highways belong to the public, the public have rights that must be respected. The whole public including manufactures, corporations and banking institutions should help to keep up the roads by a tax paid into the county treasury out of which the engineers are to receive their pay; county commissioners to estimate and levy tax for this purpose.

ROBT. K. TOMLINSON, Bucks county. It seems to me that the great defects of road mending as now attempted, rather than done, in this locality; are as follows:

First. It is not pursued as a business or occupation by any one; hence there is not the requisite skill and experience required to deal effectively with the difficult and varied circumstances of the road problem.

Second. The supervisors, elected presumptively to fulfil their office only a short time, have other business which they consider paramount in importance, and hence neglect the roads at critical times.

Lastly, The exigencies of their main occupation and also that of the farmers who assist them, require them to go over the roads hastily, looking rather to temporary repair than to permanent benefit.

To lessen the above defects I would suggest the following changes:

First. That only one supervisor should be elected in each township, and at such a salary (made possible by the fewer number) that it will be an object for men to fit themselves for the position. To aid in such education, I would have a county superintendent elected by township commissioners and bearing much the same relation to the supervisors as the county school superintendent does to the teachers.

Second. I would have the supervisors elected for a term of three or five years, and with the understanding that their whole time and services should be given to the roads. I would have the township furnish also a team of heavy horses, a plow, dumping wagons, a road scraper,

a stone breaker, etc. Also a shelter tent for horses and men when in distant parts of the township from the central station. I would have the township furnish one, two or three steady laborers at a less salary than the supervisor, who must be, not merely an overseer, but the head worker in the force.

Third. I would have farmers and others hired to assist only in the stone hauling, when they should be paid not by the hour, but by the number of perch of stone hauled per mile. I would have county roads declared necessary in the county in the same manner that county bridge are, and these made and kept in repair by the county, with the paid assistants, when desirable on both sides, of the township force.

Lastly. I would have a road commission elected in each township of three men to serve, without salary, as an advisory and arbitrating committee on disputed points, and to have full charge of the funds of the township. Perhaps it would be better to have them to still more nearly correspond to school directors and have them to appoint and control the supervisors, etc.

J. T. JENNINGS, Susquehanna county. We have too many roads; better have a few roads well graded and constructed than a greater number unfit to travel and practically useless. Originally the settlers located on the hills, and in many cases the roads followed the paths which had been made to accommodate travel without reference to hills. In too many cases the roads are still located on the original path. Individual interest too often operate in the location of a road and causes it to go over a hill when public interest would place it on more suitable ground.

Great care should be taken in the selection of proper persons for viewers, and only an experienced engineer, with the best of judgment, should be entrusted with the work of the laying out a main line of road; too often we suffer from the work of incompetent viewers and only learn the cost of the error after it is too late.

There is no doubt but that macadamizing is the best, but such a road is very expensive, and all sections could not afford the expense. Such work could only be done on the leading lines of road and then only on a small section at a time.

How shall we expend our road taxes to the greatest advantage? Shall they be worked out or shall they be paid in money? There is not a shadow of doubt that better results could be secured by a money tax, and it must eventually come to that. Our farmers are now suffering from an over burden of taxation, and I hardly think that a law requiring the payment of the road tax in money would be popular.

In regard to the taxation of all classes of property for road purposes, I can see no reasonable objection. It is not right that farmers should build and repair the roads and that all other kind of property should go free; others use the roads and should share in their construction and repair.

The first thing to be taken into consideration in making a road is the grading lengthwise, avoid as much as possible dead levels. I have often seen a road left for years which, if graded, would have been a great deal easier on the teams and the road would wash far less. This is generally pretty well understood by our supervisors, but they are too fearful about incurring the first expense unless the hill be a very short one. This operation of lowering grades becomes of much more importance when the roads are macadamized.

The next thing to be considered is the grading of the cross sections.

There should be a gradual rise from each extremity of one-half inch or a little over to the foot to the center, not making any provision for a ditch. A ditch with perpendicular sides concentrates the whole force of the water into that space, and is a constant source of damage to the road; if the road is graded from each extremity like this when there is a large amount of water running, it has a chance to spread out and a large proportion of it is so shallow that it has very little force.

But the all-important point is to make the road of such materials that it will be so hard that a loaded wagon will make no impression upon it, causing no rut which will serve for the collection of water, and so even on the surface that there shall be no rising of the wheels of wagons on the top of lumps and then falling down to a lower surface, thereby crushing the material of which the road is composed.

No positive rule can be laid down for the material to be used in the construction of a road, as it must, in large measures, depend on what can be found in the near neighborhood: limestone where it can be obtained is generally considered one of the best.

When the material has been decided upon, it should be broken small enough to go through a one and one-fourth inch riddle; all that will go through a one-fourth riddle is not fit for use; all that will not go through the larger riddle must be broken over. This is essential to a perfect road. When the material is prepared and the road graded, the broken stone must not be let drop from a wagon as that will never make an even road, but it should be sown broad cast with a shovel from a wheel-barrow when the surface of the road bed is dry and firm.

The bed of broken stone must be at least ten inches thick. With a few days travel, if the loads which pass over it are not so heavy as to displace the stone, the surface will become even and compact. Whenever a road needs repair it ought to be attended to at once, and the proper way to do it is to put on a very thin coat of broken stone prepared and applied as at first, but before the application, parallel lines should be drawn about ten inches apart with a sharp pick across the road not more than one-half inch in depth which will facilitate the combination of the new stone with the old bed. Mud must never be allowed to accumulate on a road as the stone will wear a great deal faster when wet than when dry. If your road is kept in proper shape and clean of mud it will require very little repair.

H. H. BROWN, Columbia county. The time has arrived that the laws for roadmaking should be changed, so that the tax should be paid in money the same as all other taxes and collected and placed in the hands of the township treasurer. Then only to be drawn from the state by an order signed by the road supervisor, and countersigned by the township clerk.

The road supervisor should each spring examine the roads in their township and make an estimate what the cost will be to repair and keep in order the road during the next year (except for permanent improvement). And after giving public notice of the time and place by posting in several places in the township that there will be a letting of the road repairs and keeping the same in good order. At that time the supervisor with the town clerk shall constitute a board to receive such bids and to examine the same, and if any bid is satisfactory, then and there they to enter into a bond and contract with the lowest and best applicant to the end that the roads shall be kept in good repair during the year. The pay of the supervisor and town clerk shall not exceed two dollars per day. Any difference arising between the contractor

and supervisor in regard to the settlement of any extra work, shall be referred to the auditors whose decision shall be final.

All classes of property should be liable for road tax. For the real estate is now over-burdened with taxes, and to properly repair and construct the roads it will be necessary to have more funds, and as there are many classes of property now exempt from paying road or local taxes, it is nothing more than right that they should bear some part of the road expenses. For the permanent improvement of the roads, I believe the state should give some aid. From what source the state should receive that money to appropriate to the several counties and townships for road purposes, I cannot say. But I would suggest that the state appropriate a sum for each township for permanent improvement in ratio according to the last triennial valuation of its real estate. Such sum to be expended in the crushing of stone for the macadamizing of a certain portion of the road each year. I believe that if several townships owned an engine and stone crusher which could be mutually used during the season, and such stone hauled and filled in on our roads at least six inches thick in the center, they would become a permanent road bed. The owner of land having stone would be benefited two-ways, by having the stone removed from his fields, and again by having good solid road to drive over in going and coming from market. In our township we have limestone which is used on the roads in the eastern portion, and it makes a complete road; but in the western end we have clay hard-pan soil for road beds, and the limestone spalls have to be put on very thick or it will not make but little improvement. Although we can see the benefit to a certain extent for years, for when nothing has been put in the roads but earth, they are almost impassable with mud; where the stoned roadway is it is dry and hard.

JULIUS LEMOYNE, Washington county. That each county shall have three road commissioners, one elected or appointed each year, to serve three years, whose duties shall be same as the road viewers as now appointed by the court.

That each county shall have a competent civil engineer appointed annually by the court, who shall accompany the road commissioners in making new roads or changing old ones; the matter of damages and benefits shall be subject to appeal and testimony before the court.

That on leading or important roads where the grade and road bed are satisfactory to and approved by the road commissioners and engineers, that adjacent owners shall pay two-fifths, the township one-fifth, the county one-fifth, and the state one-fifth, of the cost of macadamizing or other method of constructing a permanent road as shall be best suited to the locality where it is constructed.

All such improved roads shall be subject to inspection and approval of road commissioners and engineer, and no payments shall be made by state for less than five continuous miles in length. No payment shall be made by county for less than one continuous mile in length.

The width of all such improved roads shall be determined by road commissioners and engineer.

In making, repairing and maintaining all township roads, I am in favor of local or township supervision.

1. Yes; all road tax should be paid in money.
2. Yes; all classes of capital should pay.
3. Yes; answered more fully above

D. Z. SHOOK, Franklin county. To your first proposition, "the payment of road tax in money instead of work," I will say that I can see

no great reason why the farmers should not be allowed to work out their road tax when they so desire. It has been claimed by some that the service thus secured is poor and unsatisfactory; but why a supervisor, if he be the right kind of man, should not demand and secure as full a day's work for a full day's pay under this plan as when the tax is paid in money, I do not clearly see. True I have known of cases in my own district in which supervisors have allowed farmers, as well as others, to put in half-grown boys as full hands, who could not render adequate service, showed favoritism in many ways, made the roads in a slipshod manner, and allowed the township to be taken advantage of in innumerable ways. But it was all clearly the fault of the supervisor and not the fault of the system. To make road tax payable in money alone, would be an unnecessary hardship to a large class of farmers who are scarce of cash, but who have laboring help plenty and would not, unless we had the right kind of men for supervisor, be of any advantage to the township. We have had in my district time and again supervisors elected through sympathy because they were entirely unable or unfit to support themselves in any other way or calling, and herein lies the great difficulty. Without experienced good supervisors, we will not get good roads under any plan.

To set aside one mill of the tax on personalty for road purposes, payable of course only in cash, and allow the present tax on real estate to be worked out when desired, under a proper and efficient supervision, would no doubt make an improvement and would be acceptable to a large majority of the farmers.

Your second proposition, "the taxation of all classes of property for road purposes," if it implies that all classes of property should bear equal burdens, does not meet with my approval. It would be very impracticable and would, if enforced, work injustice to the debtor class as well as the capitalist. Moneyed capital being extra hazardous as an investment and having in addition to bear equal burdens with real estate, will seek other channels of investment and the borrowing class will not be accommodated with the ease, nor at as low a rate of interest as they are now. As to the capitalist, the state limits him in what he shall make out of his money, but on real estate he may make all he can. Should the state tax this moneyed capital any more than at present, it will have to raise the limit of legal interest above six per cent. or rather let moneyed capital stand equal with real estate and allow it to make all it can. Either way the borrower is bound to be the sufferer.

Your third proposition, "the extension of state aid for the permanent improvement of township roads." I have already indicated how a portion of the three mill State tax on personal property could be set aside for road purposes. It would be the plainest act of justice for the state to aid us in maintaining good roads throughout the state. Farmers are not the only class of people who use the roads. The town and city people all use them. The commercial drummer is continually on them, the manufacturer sends his goods over them, the bicyclist rides over them, and the rich summer tourist takes his family driving over them, the huckster gathers in the toothsome spring chicken over them, and I end my enumeration with the undertaker who finally drives us all over them. The roads should not only receive state aid, but they should be divided into three classes: 1. Those leading to important points or from one town or city to another. 2. Those leading to points causing much travel, but not really through roads. 3. The by-ways and roads

leading from one road of the first class to another road of the first class, etc.

Dr. J. P. EDGE, Chester county. There is a growing and reasonable sentiment in this section in favor of making and mending the public highways on a business basis. That is, for the money to be raised on all classes of property benefited, and spending that money to the best advantage, under skilled management and effective labor. Wiping out the old shovel brigade as a thing of the past. The generations that have preceded us were in a measure content with such roads as a false economy supplied them. But the man of to-day, with his lighter running gear, improved machinery, and better horses, with more occasion for using the public road, wants something better and should have it.

In incorporated towns and cities all property is taxed for local purposes; it is spent largely in the construction of paved streets and water ways to carry off surface water, and this is done for the convenience, not only of the residents, but for the benefit of all persons outside who may use the streets. Now is it fair that one kind of municipalities shall do this and another be exempted? Or is it not fair to expect that when the townspeople are called into the country, they shall find as well-kept roads as they provide at home for their country cousins? The town in which I live, Downingtown, is badly governed; this is admitted by the taxpayers especially, and yet with numerous jobs and much extravagant methods in vogue, we Telford our streets, every year extending the mileage of paved, curbed and guttered highways, until as a general thing we have an admirable system of roads for a town of 2,500 people. The borough tax rate has not been higher than four mills so far as I remember, and this rate pays all expenses including interest, salaries, etc.

The property holders have been many times compensated for the expenses incurred, and could not be induced to go back to slushy roads. This would be the result in a large majority of townships; but of course no one expects to see all roads telforded at once. The proper thing will be to go steady, but not too slow. Do the worst roads first, and the others will follow per force.

In view of the near future when the state shall be rid of her debt, I do not know a better way to absorb the large and steadily increasing revenue than by a system of distribution among the counties, similar to that of the school funds. Not having looked into the constitutional question, I cannot say what of that. The learned jurists must fish in that stream.

H. W. NORTHUP, Lackawanna county. One great hindrance to having a good public road, is the usual method adopted of working out an individual road tax.

The intention of this system undoubtedly was originally good and economical, but the result is not satisfactory. It is an established fact that farmers as well as others take advantage of privileges, and do not perform the same amount of labor, neither do they do it as permanently and skilfully as could be accomplished with a much less amount of tax, when that same tax was paid in money. The farmer says the times are too stringent, he cannot procure money to pay this tax. It would be a burden in many instances to enforce a law requiring him to pay this tax in money. It is true that the farmer's dollar usually comes hard, but his time is the most valuable on the farm in planting the seed and cultivating the growing plants, just when the work can be the most

judiciously performed in constructing and repairing the public road. It is evident then that either the road or the farm must be neglected, if the farmer works out his individual tax. If then the farmers business is worth anything to him, he can secure as much value for the time occupied on the road, in strict attention to the cultivation of his own products.

If this is true with the farmer, it is certainly true with every other business, and we conclude that a money tax is the most desirable and economical. There is another consideration of this topic where a change in the source of taxation would better the condition of our public roads. If all classes of property was taxed, real estate would not be burdened to the extent that it is, and the appropriation for road purpose could at the same time be greatly increased.

It is said on good authority, that real estate in Pennsylvania pays nearly four-fifths of all the taxes. For this reason as well as others the farming is struggling with financial difficulties. The public road is a universal benefit. It benefits all classes of business and occupations, and it is no more than just that the cost of construction should be equally borne in proportion to any capital we may possess. The fact stares us in the face, that there is a very great deficiency in means provided to meet the expense of properly constructing permanent public roads. A macadam road is undoubtedly the best of any we may hope to obtain, and yet we cannot anticipate that to any great extent, unless we receive state aid. If the State of Pennsylvania should see fit to enable us to make our most important thoroughfares stone roads, then we would be in position to take care of the rest of our roads that may be considered less important.

Roads can be more economically constructed now than ever before. The invention of road machinery is accomplishing wonders. A dirt road can be put in repair at much less cost than with the old farm implements of plow and scraper. A permanent road of stone can be built at less expense by using the patent crusher. But our public roads in the great State of Pennsylvania are so numerous that it requires a vast amount of capital to make them permanent and desirable. The fact that our toll roads, though very expensive in their construction, are paying satisfactory dividends is a sufficient guarantee that money could be saved in constructing permanent roads for the benefit of the traveling public. The material for the construction of such roads is abundant and convenient, especially throughout northeastern Pennsylvania. Some portions of the state will encounter greater difficulties. As the road question has been so thoroughly agitated all over the state during the past six months, it is expected that in the near future we shall have better roads and a better system of keeping them in proper repair.

DAVID WILSON, Juniata county. I think there can be no room for doubt in the mind of any man who will consider this point candidly. The trouble has been and is now that too often our supervisors are not suitable men for office. They have not energy enough to push work as they are too modest to insist upon a neighbor doing as much work in a day for the township as he would expect to have done for himself. The office of road supervisor is really a very important office. He holds in his hands, in a measure, the property of his neighbor, and is accountable for the judicious and honest expenditure. He ought in all cases to be a practical man, with knowledge enough on the one hand to know how to make or repair a road, and energy enough on the other hand to get a good honest day's work from every man or team he employs. He

should be made responsible to the public for the well keeping of the roads, and liable in damages for neglect of duty; and, of course, should receive a fair compensation for his services. Don't say that such men cannot be found in every township, or, if found, will not serve. The time is not far distant when the good roadmaker will be looked upon by his neighbors as a public benefactor; when the public will realize that good roads really and rapidly enhance the value of property; that good roads will not merely enhance the value of your broad acres but will considerably reduce the cost of your transportation, not merely in time and distance, but in the wear and tear of horse flesh and machinery; and then whether the old folks or the young folks wish to take a ride for pleasure, as a rare respite from their daily toils, or to pay a brief visit to some of their friends, how much is the pleasure sweetened by the consideration that you can speed along over the hard, smooth, level road, so safely and delightfully. Good roads are evidences of the advance of civilization in every country that is civilized. The Appian Way, a solid road built in the palmy days of the Roman empire by Appius Claudius, is a good road to this day, and some of our countrymen have travelled through the valley of the Rhine, and have ridden on bicycles even by moonlight to the top of some of the highest mountains of Switzerland, and have ridden down the same mountains much faster than you would like to ride a horse down. The supervisor should magnify his office, and should be honored by the people, if he fully and faithfully discharges his duties. As a general thing, the men who are not too ready to offer themselves for office, or too eager to obtain it, make the best supervisors. If the tax is paid in money he can expend every dollar of it in the township, and will thus be able to procure the most profitable labor, and need not be bored by ignorant, lazy or inefficient hands. Upon the whole, therefore, as nearly as I can gather the public sentiment, the old law of each township electing two supervisors, making them responsible for making and maintaining the roads in good condition cannot be improved upon. If they fail to find such men, it is not because the township does not contain them, but probably because some one less suitable and less desirable is more anxious for the office.

More work and better will be done by good supervisors according to the present method than by any other, if the people choose the right men for the position and give them a cash tax. But if they choose lazy, selfish, ignorant or incompetent men upon themselves be the loss. In conclusion on this point, therefore, I would say that public opinion is in favor of the clause of the old law that provides (1) for the election of two supervisors in each townships, and (2) that the tax be paid in cash.

2. *The taxation of all classes of property for road purposes.* Everybody needs roads, everybody uses roads, a civilized community cannot exist without roads, nor can any advancement be made in human society without roadmaking. The junction of the Allegheny and Monongahela rivers, and "Kittanning Point," were landmarks well known to the wild and savage tribes that used to roam over these mountain wilds. And if these untutored red men had continued to occupy these forests and mountains, there would have been nothing to resemble a road but the blazed tree, the battered rock, and perhaps here and there a scarcely perceptible path on the sloping mountain side, though many a warrior's foot may have trodden it. Have you ever thought of how much roads have done for the civilization of Pennsylvania? How much they have

contributed, in a thousand ways, and are now contributing to the population, wealth and happiness of the people? What an indispensable necessity they are to the safety, preservation, improvement and even the acquisition of property? Why then should not all classes of property, now taxable for other purposes, be also taxable for road purposes? We can see no reason whatever why it should not, and we believe that the large amount of property now exempt from taxation for road purposes imposes an unjust and unreasonable burden upon those who make the roads, *i. e.*, the farmers and land owners.

3. Should state aid be extended for the permanent improvement of township roads? When we consider how numerous are the progeny, and how few and small are the sugar plums to be dropped from the mother's lap, we cannot but think that however kind she may feel, it would be an impossibility for her to satisfy all that would be crying for favors. We think this would be impracticable. It is true legislators sometimes appropriate public money for unwise purposes, and often for unconstitutional purposes, but the public treasury is not to be raided for all purposes. The freedom taken for the last few years in our national as well as our state legislature of raising committees to travel over the country in the summer may be very pleasant junketing parties for the committee; but a due regard for the public treasury on the part of our legislators would make these raids less frequent. The treasury should be sacredly guarded. The taxes already are almost unbearable, and by the time they are all paid, there is but little left, either to landlord or tenant, but especially to the tenant.

A. SHARPLESS, Chester county. *First.* As to the payment of the road tax in money instead of work? The extinguishment of road tax by the method stated (for it don't pay anything) has long since proved a failure; the supervisor gets but little, if anything, in lieu of the tax assessed.

The taxpayer looks upon his share of the contract as "payments for a dead horse," and gives as little as possible.

The labor furnished is generally inefficient and grudgingly given. At times suitable for the repairing of roads, farmers require the assistance of all able help they can command on the farm, so that the old men, boys and half hands are turned in to work out the tax at full wages, if the supervisor be a good neighbor and clever fellow.

From observation I judge that with the tax in hand, any intelligent supervisor could, with experienced labor under good discipline, do twice the work accomplished in a given time by the mixed party, who are too apt to meet on the roads for jollification rather than to do any efficient work.

At least three-fourths of our supervisors know nothing of roadmaking other than the defective methods handed down by their predecessors from many generations past. They have no idea of new or scientific methods that might be adopted, nor could they apply the same with the help of the mob labor now furnished by taxpayers.

Of the supervisor and his workmen, the latter know as much, or perhaps, in their own opinion, more than he does about roadmaking, when all become bosses, disputes arise and the authority of the supervisor is ignored. He cannot afford to quarrel with his neighbors and constituents, and as we see the result is a continuation of roads forever in want of repairs.

Second. "The taxation of all classes of property for road purposes." That personal property should bear an equal share with real estate in

the construction and maintainance of all township roads, is not to be questioned upon any equitable grounds. Real estate owners have no exclusive or superior rights or privileges on the highways that it should bear all the cost. When out repairing road I have seen bankers, judges, lawyers and "bloated bondholders" driving by with their splendid span of horses and fancy rigs. They have even stopped to complain of the bad condition of our country roads. In such cases I have offered them a shovel, and politely suggested the propriety of their alighting and doing their share of the work, or if they did not like that, I proposed that they might contribute in cash towards having it done. Such parties seldom complain a second time and never offered the asked for contributions.

Third, "The extention of state aid for the *permanent* improvement of the roads."

To make the state the initial power of control over all roads within her borders, "and she should not be asked to make investments or place money where she has no control of the same," it would soon throw into the hands of irresponsible leaders a vast political power that would prove dangerous to the integrity of our commonwealth, and in time possibly wreck our boasted independence.

Remember the political power wielded but a few years ago by the canal commissioners with but one road, or through line from Philadelphia to Pittsburgh under their control, and how party supremacy was maintained through the use of its revenues and offices, for the corruption of voters for many years.

With a revenue of seven or eight millions annually of road tax in their hands, any party could and would maintain itself against all comers. Its ramifications and power for evil would be felt in every township in the state with constant danger to the people.

No, the initiatory power over, and control of common roads should be in the county, and even then it would be a big thing, requiring skill with no little executive ability in its management.

That our laws now making townships the unit or starting point in roadmaking and control have been a failure, has long since proven to be a fact. Why has this been the case? I am constrained to believe that it arrives largely from the weakening that comes from a division of force. The annual road tax of Chester county I roughly estimate at one hundred and thirty-six thousand dollars. The amount of force in this sum undivided and judiciously exerted would far exceed that of the same amount divided up as is now the case, amongst sixty-eight townships.

The waste consequent upon such a division of capital would at once be apparent to any one accustomed to large operations in business.

Not only the direct loss in the power of this large sum of money, by division, is to be considered, but the large addition in the cost of management in its disbursement when turned over in dribblets to the one hundred and seventy supervisors of roads of the same county. These supervisors are nearly all men who have had no experience in the management of any considerable force of workmen, and of course seldom secure the best results to be derived from well-organized and well-directed labor. They have little or no knowledge or skill in what might be called scientific methods of road construction.

Now what we need for the permanent improvement of our public highways, and nothing less will do, is a complete and thorough change from the old do nothing but patch systems, to new methods based

upon well-established business principles, and a thorough application of all scientific knowledge attainable to the work, with a conservation of money force through concentration of the same.

With an efficient and properly organized force to manage the roads, one-half the road tax now raised and wasted upon repairs by ignorant supervisors and inefficient labor, might be saved and applied to permanent improvements.

In the absence of any better proposition from men who have given this subject more consideration, I would suggest that all of the old road laws be repealed, to be replaced by a general law making the county the initial authority in the construction and repairing of all roads within its borders.

That a commission of say three or not more than five men be elected from different sections of the county to serve for three years, and be known as the board of roads commission, to have charge of laying out, constructing and repairing all roads and bridges. They might have authority to grade, or change location of roads, and even to assess damages, of course under and subject to the supervision of the courts of the county.

Under this board and subject to its orders should be a competent civil engineer learned and experienced in the science of road construction.

The county should then be divided into several, say eight, ten, or twelve convenient road districts, each composed of several contiguous townships. In each district, one competent road supervisor should be appointed to direct and control all labor, under instructions from the engineer-in-chief.

These supervisors should be furnished, each, with all of the best appliances, such as stone crushers, road scrapers, other machinery, and tools for carrying on their work in the cheapest and best possible manner.

Their labor should be employed by the year so that it might become experienced and therefore the more effective.

These supervisors would fill the place of the one hundred and seventy inefficient and costly supervisors now controlling the roads of Chester county at a greatly reduced expense to taxpayers. Twenty experienced laborer under the supervision of able managers, and accustomed to their work, would do as much and better work in a day as three times their number of the inefficient crowd heretofore brought out to pay their road taxes in labor.

A comparatively small force of men would be needed if retained in service the whole year. These men would make road building a permanent occupation. The commissioners would then have a force upon which they could always rely, and would soon be able to calculate with some degree of certainty what amount of money they could safely devote to permanent improvements from year to year, and I have no doubt that the savings from this better organization with the economy likely to ensue will be sufficient to carry on the permanent work proposed quite rapidly without further taxation.

How permanent roads may best be constructed depends very much upon the nature of the grounds over which they run, but this practical work can be safely trusted to the wisdom of skilled engineers with whom the responsibility should rightly rest.

JOSEPH FLOWERS, Bucks county, Pa. *First.* I believe that the present law, which compels the supervisor to notify taxpayers that they may work out their road taxes should be repealed, and the taxes be paid in

money, thus allowing the supervisors to employ labor where it can be procured to the best advantage.

Second. I most emphatically favor taxing all kinds of property for road purposes, manufacturers, bankers, investors and all who pay but little tax now for local purposes, need and appreciate good roads, as much as those who have the whole burdens to pay, and they really demand more protection from local taxation than do the farmers; it is largely this class who favor the improvement of the roads, knowing full well that under the present laws real estate will have the bills to pay.

Third. With proper restrictions I think the state should extend aid for the permanent improvement of our roads. The farmers under the present revenue laws are already too heavily burdened; so much so that to add to this burden by requiring them to pay for permanent improvements to any considerable extent, would be ruinous to their business. Rather let the state tax be increased upon many classes of property which pay no local taxes, and let the state expend it for permanent improvements of our road.

M. S. Cook, Chester county. I am quite sure we would have much better roads and at much less cost by having them worked and kept in repair by paying for said work in cash to a set of contractors who should be employed by a general supervisor, who should be kept constantly on hand always ready to arrest a break or wash soon as started, which many times would save the expenditure of ten times as much work or cost; as well as keeping bridges and culverts in a safe condition, and by thus employing reliable parties (having them under bonds) and paying cash, we would be entirely justifiable in insisting on the work being completely done, and I am very sure it can be done more reasonably and lower, as the business now is managed under present laws it often happens that good able-bodied workmen cannot be had just at the proper time, and supervisors have to employ old men and boys or trifling persons who care only for the money, and to get in the time, or allow the work to lay over until it has increased greatly from renewed rains, or the ground grown so dry and hard as to require often double the work, whereas if looked after by a party who was bound to keep the roads in good condition, he would be ready and prepared in proper time.

In regard to taxing all kinds of property to pay for road repairs and improvements, it seems to me very proper and right that all property should be taxed for said purposes, as most every person travels the roads more or less, and should help pay for keeping them in good order, and again, I am sure the bondholders and heavy capitalists are just as much bound (or should be) as farmers or any other class of citizens, also corporations, banking and syndicates, are all either directly or indirectly interested and should help defray all public expenses, as all classes of business are very greatly dependent upon the agriculturists, and as it now stands, we farmers are bearing by far the greater part of said expenses, and are already working under undue discrimination and oppression. Therefore, it appears to me not only just, but really imperative on these richer classes, especially, to pay at least a proportionate part of said tax, even if for their own benefit, if nothing more, knowing that if farmers do not prosper they will suffer more or less.

And as to the state helping to support the public highways, I think it just as important and as necessary for it to help maintain and improve public roads as it is to improve and keep open our navigable

waters, which are really public highways for the people, and this they freely do by frequent appropriations and orders to open certain rivers or remove various obstructions in our great waters, either state or national, as the case may require.

S. W. MORRISON, M. D., Chester county. I am decidedly in favor of new road laws—not revision of the old ones. Of first importance in the new laws, a general state supervision should be provided for, through a state superintendent with a superintendent in each county, all of whom should be skilled surveyors paid by the state a reasonable salary, say of eight hundred dollars, and an allowance of a certain mileage to cover cost of conveyance to places of work.

These surveyors should have authority to lay before the courts the matter of roads to be vacated and new roads to be opened. Within a few miles of my residence there are more than a dozen instances where the present road goes over the hill and where the hill could be entirely avoided by going around it without increasing the distance materially, and indeed in some cases the distance would be less, and the expense for repairs of these roads around hills is greatly less, and they rarely get badly cut up. The work of making new roads and repairing old ones should be by a supervisor elected as at present, and employing the best laborers obtainable, but under the general instructions of the skilled county superintendent.

I believe in equal taxation on all capital whether invested in land, manufactory, or western mortgages. I see no reason either why telegraphic, telephonic and electric-light companies occupying and obstructing our highways should not be taxed specially: let no business carried on in the state for profit escape.

In answer to your third question, I think the state might agree to give two thousand dollars per mile for all roads macadamized twenty feet wide according to specification.

W. KENDERDINE, Bucks county. Our road taxes should be made payable in money and not in labor, for the reason that so many able-bodied farmers are too busy with their own work to answer the call of the supervisor when the necessity for mending roads is most imperative. It has been the common practice to delay work upon the roads until the latter part of May, when the last belated farmer has his corn planted, and then a regular township parade is marshaled at a given point, under the command of a supervisor. This medley force of tax workers is made up of all the different phases of humanity, wherein found the old and the young, the lame and halt, the submissive and the insubordinate, the solemn wise, and the merry foolish, the honest worker and the guilty shirker all engaged in the pastime of working out their taxes.

At the word of command the sod begins to fly into the middle of the road while the stones are thrown under the fences. This annual proceeding is commonly called road-mending. Why the necessity for these township meetings on the public highway when a few good laborers would be all-sufficient and much more economical?

It is as unkind as it is unjust to conscript our aged grandfathers, and depopulate our schools of half-grown boys, and expect them to keep our roads in order, while the able-bodied citizens exempt themselves from such duty, for the reason they are too busy with their own work, or because the wages allowed them are not sufficient.

We have out-lived the provisions of our ancient road laws, and the sooner our legislators will give us a new one, arranged in all its details to suit our modernized needs, the better it will be. Give the super-



100 feet.

visors full power to collect and expend the taxes as they may direct; release them from being compelled to notify all taxpayers, and then they will select competent workmen to the exclusion of fickle youth and tottering age.

Taxpayers who are able and willing to work out all or a portion of their taxes should be given the preference, but a severe line should be drawn against indifferent workers who seek to impose upon the public.

All properties of equal value should be taxed alike for road purposes, including all real and personal property now taxed by either state or county, so that the burden of taxation will fall upon all without favor or partiality. The fortunate possessors of money bearing interest should be willing to bear their share of the taxes for improvement of roads, as many of them receive their full share of advantages derived from improved highways. A per-capitum tax should be levied upon every citizen voter, the same to be collected as now provided by law relating to road taxes.

There is a general sentiment among men most interested in having our roads permanently macadamized that is favorable to granting aid from the state, differing only as to the best way of attaining the end desired. To apportion such appropriation to the several counties or townships in proportion to the amount of taxes expended for road purposes, or according to the number of miles of roads within a certain district would be difficult and almost impossible.

The only way to avoid the many objections to granting state aid, would be to enact a uniform law applicable to every district alike, that whenever any township shall, through its board of supervisors, agree to expend one-tenth of its tax collected or assessed for road purposes, in permanently macadamizing the most needed sections of its roads, (this rule to continue until all necessary roads have received proper attention) and when said board shall, under oath or affirmation, administered by the presiding judge of the county, declare they have expended full ten per cent. or more of road tax collected by them, amounting to \$—— in permanently macadamizing certain sections of roads within their district, giving a description of the extent and locality of the improvement made by them, then the president of said board shall receive from the clerk of said court a certified copy of said declaration. This copy shall entitle the president of the board of supervisors to draw an equal amount of money from the state treasury, to be expended in macadamizing *additional* extent of said roads—provided that no township shall receive more than \$1,000 per year from the state.

A board of supervisors should consist of not less than three nor more than five members; one of them to be elected annually each year. They should, after each election, proceed to organize themselves as a board by electing one of their number as president for the ensuing year. The "town clerk" should act as their secretary, who should keep a record of their proceedings in books provided for the purpose. They should have twelve regular meetings each year. A majority vote of the board shall decide as to the extent of repairs and improvement most necessary, and shall fix upon the amount of expenditure, arrange the hours of labor, adjust wages and assess taxes. Each supervisor to act as overseer of the poor in his district assigned him and shall report to the next meeting of the board the names of persons or families needing assistance, the same to be recorded by the secretary.

If the plan proposed should meet with favor and laws enacted to carry

the same into effect, the result will benefit all those townships that choose to avail themselves of the opportunity offered them to gradually macadamize their roads, while the assistance granted them by the state will encourage them to still greater efforts. In no other way can the result desired be attained. By this plan no additional officers are necessary, no boasting contractor, no officious engineer will be needed. The longer term of service given to the supervisor will give them an opportunity to educate themselves up to the necessary requirements until they become efficient. Let us escape, if possible, any increase of officers, particularly those not elected by the people, for the honest and faithful citizen knows not so much of law as he does of "laws delay and the insolence of office."

JOHN C. BOAL, Westmoreland county. As to the first, I would say that I have always disapproved of the enactment of a law for the entire Commonwealth of Pennsylvania, which would require the payment of road tax in money instead of work.

As to the extension of state aid for the permanent improvement of township roads, I will say that my approval or disapproval of such an arrangement, would be determined by a knowledge of the source from which the state would propose to replenish her treasury after such disbursement; if such state aid as has been referred to should be secured by requiring farmers to pay additional percentage on their property to what they are already paying, I would not favor such extension, as I think that the matter of raising and expending the farmers' money for road purposes, could be done to suit varying circumstances and conditions better by local officials than it could be by the direct interference or services of the state.

My idea is to let every township rely on its own resources for the improvement and maintenance of its roads. Of course if state aid could be secured for the improvement of township roads without increasing the farmer's tax, such aid would be thankfully received. But as we have said, if farmers are to pay for all the improvements on their highways, let the funds for such purpose be raised and expended in the same locality and in amounts adequate to the changing environments and circumstances in the different localities in the Commonwealth.

HON. WILLIAM GATES, Venango county. Under the supervisor law the supervisors are the financial board who levy the tax and have the supervision of all the work done, but they must notify every taxpayer when and where they shall work, and must have sufficient given to work all his or her tax, or collection cannot be enforced. The act of 1844, which was extended to a number of the northern counties, provides for the election of three road commissioners who act as a finance board and have a general supervision of the roads, with the further provision that one pathmaster shall be elected for each school district in the township. It is a very common occurrence in the selection of a pathmaster, to select some old worn-out man or cripple, and select him through sympathy, who has not a single qualification to direct how roads should be made or repaired. As the pathmaster is elected by the voters, they may obey the orders of the commissioners or not just as they please, and the commissioners have no remedy, except to impeach before the court, under the act of 1844. The taxpayer must be notified of the time and place he shall appear to work his, her or their tax, and be given sufficient time to work all the tax or collection cannot be enforced. The work feature of the road tax is a grand farce. The opposition to a cash road tax comes from the small taxpayer who can work his tax

in a day or two and save paying the cash, and the town loafer and small boy, who is so worthless that no body wants to employ them, or too weak to do the kind of work required to be done. All they want, is to get on the pay roll. They care nothing about the road and do as little as possible, and nothing right, but the supervisor must keep his temper, and permit the taxpayer to work out his tax. Under such systems it is impossible to get good work done. Our road laws lack force and a strict accountability and good service. There could be a great improvement made in our roads, if the taxpayers would take an interest and see that their tax was honestly and properly expended. Laws will not make roads, it requires hard work and engineering skill. No law can be framed to meet the requirements of every section—where there is much travel and a heavy traffic a more substantial road with harder material must be used than where there is but little travel and traffic, and that should be left with the officers in charge to meet the requirements.

There has been an effort made at nearly every session of the legislature to amend the old or originate a new system to open and keep in repair our public roads. The latest effort has been to establish a county system, but the farther you place improvements from those interested, the less interest they will take, and the more it will cost. The greatest obstacle in the minds of the legislator seems to be that no law can be framed to meet the requirements of all section of the state. That difficulty is fallacious, laws do not make and keep roads in repair, and if the people of any community are determined to have good roads they will have them law or no law. The law may say how a road shall be laid, how wide it shall be, what the grade shall be, and may say whether the taxpayer shall pay his tax in money or shall have the privilege to work his tax. But it should not say what kind of material must be used, or that the roads must be uniform in construction, for the reason that the same kind of material is not attainable in every locality, and the travel and traffic varies so much that the road must be constructed to meet the requirements. The township roads in this commonwealth are being improved every year under our present system. They are much better than formerly, notwithstanding the weakness of the system.

Our roads are generally turnpiked and drained by sewers and streams bridged and all made as evenly on the surface as the locality will permit and when the moisture is not in excess we have good roads. Repeal the work privilege of the taxpayer, and place the roads in the hands of three supervisors or commissioners, collect a sufficient tax in money and pay it over to township treasurer, to be drawn by warrant by town clerk and supervisors, for the wages of the men employed by them, and the purchase of material and necessary machinery to successfully work the roads and keep them in repair. Where the county system prevails the roads are under the control of the county commissioners, and it takes away all local interest in the roads; appropriations are made in a stringent manner, and the money lost on salaries of superintendents that do not work.

HON. LEONARD RHONE, Centre county. The farmers throughout the state feel that the construction of public roads should be left to the people of their respective townships, believing that they have sufficient interest in their several townships to construct such roads as may suit their circumstances, and meet the requirements of the public, and that no matter what system of road making is adopted in a republic like

ours, it must be left to the good judgment of the people in their sovereign capacity to elect their supervisors. The payment of road tax in money instead of work, in their estimation, is simply a scheme of a contract system whereby a few contractors may enrich themselves at the public expense, and a reflection upon the honesty and integrity of the farmers doing an honest day's work. The amount and value of work under any system must depend largely upon the managers of the roads. The taxation of all kinds of property for road purposes is but a just claim, as public roads are but avenues for all kinds of business, and feeders to the great railway transportation system of the country, therefore the farmers justly demand that all classes of personal, corporate and mercantile property shall contribute an even handed share with the real estate. Our farmers as a rule are opposed to too much fraternalism on the part of the state government, and see no necessity for state aid if justly allowed to tax all kinds of property and occupations equitably and equally for township and county purposes.

For the state to assume control of the public roads would be only to fasten upon the people an expensive road system without any voice in their control, and would in many cases prove a great hardship by delay in the roundabout way in getting redress of a proper construction of roads.

Prof. G. G. GROFF, Union county. 1. At first thought, it would appear better to pay the road tax in money, rather than in work, but I am not sure that it is so. The farmers have much time during the year when they can profitably work on the roads, and I do not think that they ought to be deprived of this privilege. I think that the trouble at this point arises from the general inefficiency of the supervisors. If proper men for this purpose could be secured, those who understood how to repair roads, and to drive gangs of men at work, I think this question would not arise. Ought we not to have institutes on road-mending, and then elect those only to the position of supervisor who had certificates of proficiency? It seems to me that there would be no difficulty in securing the proper men to conduct such institutes, and I believe that enough of our young men would attend courses of instruction to give us all the supervisors needed. Legislation would be needed on this point, but has not the present supervisor nuisance continued long enough to cause us to welcome even a new law?

2. Certainly; I would tax everything I could lay hands upon. Stocks, bonds, judgments, notes, personal and real estate, occupations, canals, railroads, telegraph wires and poles. Everything, and not one alone should pay the road tax.

3. Yes; the state should aid in the permanent improvement of *all* the main roads, though I think not of the by-roads. The main roads are those between county seats, important towns, and the main lines of travel. The towns and cities are benefited by good roads, they cheapen produce to the consumer, increase trade, are used by the citizens of towns, exist for all the people, and hence should be supported by the state government. I would not hesitate to turn the main roads over entirely to the state. This would be proper and just.

I think we need, first of all, to secure better and cheaper roads, intelligent supervision. There ought to be in each county, for a few years at least, an educated engineer, who might be designated the county road commissioner. He should be paid by the state as the superintendents of public instruction, in the counties are paid, and

should be appointed by the orphans' or other court from a list of qualified persons.

The duties of this road commissioner would be :

1. To hold institutes twice a year for instructing in proper road-making and repairing.

2. To examine candidates for the position of supervisor, and to grant certificates to those qualified for the position, and no others should be eligible for the office.

3. To pass from township to township while repairs were in progress, and to aid the supervisors by helpful hints in reference to the work or the management of the men.

4. To examine the roads of the county in reference to securing better locations, to abandoning unnecessary roads, or to opening new ones.

5. To attend conventions of road commissioners to learn of all new methods and new machinery.

6. To see that rail and private roads do not injure or in any way impair the "public roads." We have roads improperly located. In some cases they pass through swamps which can easily be avoided. They pass over hills, when a better road can be made around the hill. They cut farms badly when a little re-arrangement would avoid this. In some places there exist too many roads. I have in mind one farm in Chester county which has nearly two miles of public road used only by that farm, when a new road can be tapped by a lane one-fourth of a mile long. In this case, there is no need of any public road at all, or at least of no expense to the public, and yet the two miles of unnecessary road are maintained. I have in mind another place where no less than four public roads existed, running parallel to each other within a distance, I think no greater than one and one-fourth miles. Very properly, two of them have been closed in recent years. I could give other illustrations, but these will suffice.

Roads should be classified, I would suggest, (1) turnpikes and railroads owned by private corporations. (2) Main thoroughfares in charge of the state. (3) Secondary roads, repaired by the township, but under the county commissioner. (4) Private roads, kept in repair by those benefited, not under state or township. (5) Foots paths, public passages for pedestrians across mountains, meadows, etc., but not repaired.

There is one other suggestion I wish to make. I think that it is practical and proper to use almost all of the prisoners in our penitentiaries and county jails, in the permanent improvement of our public roads. The county could use its prisoners on county roads, and the state could employ those committed to its care on state roads. These prisoners could perform work which would not otherwise be performed, that is, improve the roads faster than could be done by taxation. To the ordinary prisoners should be added the army of tramps, and I would also suggest, the great army of weakminded, or partially idiotic persons now confined in our state lunatic asylums. These persons are now confined in enforced idleness, at great expense to the state, while they are capable of manual labor, and would be much better off if they had a chance to perform it. The question might be asked why the county road commissioner need have any oversight over railroads and private turnpikes? The answer is, men in county places, the people, have at present no one to protect their roads from great corporations. The court may do something after damage has been done, but even then the remedy is too often valueless against corporations

which furnish free passes. I will give one illustration to the need of supervision. Before the Reading railroad passed through Union county, we had, above and below Lewisburg, in all some six miles, of as good and beautiful road as existed in the state. This the railroad destroyed, and we received absolutely nothing in return, except a road too dangerous to use, and the county will have to build a new road. A competent commissioner would have saved this county thousands of dollars in this one transaction.

A. P. YOUNG, Columbia county Should road tax be paid in cash? There was perhaps a time in the early settlement of the country when it was the better way for each man to work out his road tax. The old custom still holds, not because it is the best way now, but rather because it is the old way and we haven't got out of it. We are in the rut, and an effort is needed to get out, that is all.

In the township in which I live there was spent last year about \$2,000 in work on the roads—repairs—not a rod of road made that may not need repairing again this year. The weather has been exceedingly favorable for making mortar of the clay, soil and washings put into the road, as well as for working up mud-holes and getting the mortar worked off again into the side drains. The roads are no better, perhaps worse, all things considered, than they were before the \$2,000 were expended on them. We certainly have got very poor returns for this money. Half of it spent on the worst places the other half invested in permanent road bed somewhere, where there may happen to be a mile or two of road properly located, and there would be something left for the money spent, now, it is simply sunk in the mud.

The mile of good road which might have been made, would have been a beginning, the addition of another section this year and another next, would in time make all good, then a small sum only would be needed for repairs. An entire change in the methods of road making and repairing is certainly urgently needed. A necessary preliminary step toward improvement seems to be to get the tax levied for road purposes paid in cash. We have plenty of men who would engage to keep the roads in as good repair as they are kept now for half the money in cash.

There is then great waste somewhere evidently. This may occur in many ways; wrong time of doing the work; work not properly directed; men working to get the tax out rather than to repair the road, and so on to the end, of the ways there are to get away with the tax and leave no adequate return.

The taxation of all property, according to value, for all purposes for which tax is levied is so manifestly just and right, and the people are getting so thoroughly aroused to the injustice of the present system, that redress of grievance in this direction certainly cannot be much longer delayed.

All are interested in the roads. The citizen of city and village have as much interest in having country products taken out as he of the country is. What would be the value of a fertile farm or a healthful and picturesque town site located on the top of an inaccessible cliff? Village and town property is now valued at much less in proportion to actual market value than are farms. This condition has been brought about by advance in value of town property and decrease in value of farms. The reason of this is obvious, many farm products have shrunk one hundred per cent. and some even more in a few years, while the wages of workmen have been kept up and are even now on the advance. This accounts for deserted farms and crowded towns and cities.

In this matter of taxation let all property be listed, real, personal and mixed, at actual market value, then let all bear an equal share of the cost of government, of the cost of roads, of schools and of caring for the poor and unfortunate. This is justice to all interests.

As to the question of "extending state aid for the permanent improvement of township roads." It may be practicable, but it seems to be injudicious. The revenues are derived from the people, and until the time arrives that we have no state tax to pay—if indeed that time is coming—why send money up to the state treasury and have it returned again for distribution among the same people from whom it was originally collected?

It looks very much like providing for a multiplication of percentages and salaries for unnecessary care taken. Salaries and men to draw them are much too numerous now. It would seem that the chief business of some of our legislators is to find an excuse for increasing somebody's salary, or to create a new office for some friend to fill.

Much might be saved to the people—without detriment to the public service—for use in improving roads, etc., by properly adjusting the salaries of officials. County commissioners, sheriffs, registers, prothonotarys, and other officials receive salaries or per diem enough to make it so much of an object to get the office, that frequently candidates are willing to spend more than the income of a good farm for several years, to get the position. A proper adjustment of these salaries and perquisites would go a long way toward ridding our county seats of the incumbus of professional office seekers.

From the foregoing and other reasons, I draw these conclusions and answers to your questions.

First. To improve the roads let us have a new departure. Pay the tax in cash. One half the levy of each year to be spent in permanent improvement, first grading the roads for said improvement, either by cutting down and filling, or re-locating, so as to get the best attainable grade between points to be connected this is important, permanent roads are for all time, not for this year only, and them maxium load that can be taken over a given road is measured by the amount that can be taken over the hardest place.

Second. Let all classes of property be taxed for road purposes.

Third. As to state aid let us try equalization of taxation, then so arrange that state revenue meets state expenses and avoid far as possible sending up funds to be returned.

HENRY OMWAKE, Franklin county. In this county the supevisors are not bound to allow persons to work out their road tax, but may compel them to pay in money. Though it is taxpayers and farm hands, mainly, that are employed to mend the roads, because these are often the only aid that can be secured at the needed moment.

No doubt that system which could support a regular corps of road makers, who in the constant use of the tools would give them a more skilful handling would be better than working out the taxes, yet in either case the efficiency will be determined largely by the competency of the supervision. A provision in the law giving the taxpayer the option to work out his tax should compel him to work when his services are needed, lest the roads suffer for want of attention. In this county where the position of s upervisor has been filled by competency, there has not been cause for much complaint, indeed under the present economy the complaint of bad roads, which is being heralded over the

land, is not started by the farmers who are the chief users of roads and who pay for keeping them up.

So long as land owners must furnish all the means for road improvement they should be invested with the right of control. The people may err in the choice of a supervisor, but they will correct the error at the next annual election. A reduction in wages of supervisors from two dollars to one dollar and fifty cents would have a good effect, such reduction would amount to over \$200 in this (Antrim) township, and in the county would exceed \$2,000. In other respects the present law is democratic and gives all the latitude for taxation farmers are able and willing to bear. To insure better roads means more money, and were every species of property equally taxed for road purposes, as it should be, improvements could be vastly extended.

The last year has been extremely wet, and as a result the roads have been muddy, as earth or clay roads will be in rainy weather. If our taxes were judiciously spent in putting well broken stone on the road in this county, which is nearly all of limestone formation, we would, instead of mud holes, soon have a solid road-bed. Roads uniformly macadamized, though desirable, would involve such expenditure of money as the land owners of the county are unable to support. \$200,000 would hardly pay for putting one-fourth of our roads under turn-pike, which, with the present burden of school, county and state taxes, and with wheat at seventy-two cents, would be an impracticable undertaking.

It has been suggested, and with reason, that the state should aid in effecting certain permanent improvements by macadamizing certain leading highways. There is room for such improvement in this section, and the material is abundant. If the state can devise a plan and provide the means for having it prepared and put on the road, without a burdensome increase of taxes to the farmers, it would no doubt be a commendable advance in the right direction. Whilst any law with such compulsory provisions as would vastly increase the burden of taxes to the land owner would not be in keeping with the agricultural depression of the times.

To insure a judicious outlay of funds in constructing and improving road-beds, requires competent supervision on the spot. Therefore the number of supervisors could not be lessened with good effect. No matter what the law is, the roads will partake largely of the character of the supervision. If the supervisor's methods are unbusiness like and unseasonable, the money, except the usual one-fourth which is drawn as salary, will be spent for naught. Too much time is frittered away in supervision which is no supervision, and too much labor wasted in temporizing by supplying the road bed with earth instead of solid material. Water drains are made by a sharp ridge of earth and broken stone placed diagonally in form like a half section of a log two feet in diameter, and are called breakers because they are so effectual in breaking carriage springs.

JOHN C. WENNER, Luzerne county. *First.* The people in my immediate vicinity, in close proximity, are decidedly opposed to cash road tax. This is the prevailing sentiment so far as I can learn. The prevailing cause is the uniform depreciation of real estate and farm product values. It imposes additional money taxes to the already over-burdened taxpayers.

Second. In the event the proposed road schemes are enacted into

laws, by all means tax all species and classes of remunerative property for road purposes.

Third. The state should extend state aid for township roads for *permanent* improvements, since our public highways are indispensable for the public roads, and as much used by all classes, as well by suburban as by rural population. Before the railroad era, farmers transported their products to market over long and rough roads, and now have railroads and market facilities and many other advantages not heretofore enjoyed. The permanent improvements of our country highways is of more importance to all other classes than to the farmers, hence the state should freely extend state aid.

THE DURABILITY AND ECONOMY OF MACADAM ROADS.

By S. R. DOWNING, *Member of the Board, West Chester.*

[Read at the Annual Meeting.]

A not very ready musician knows how tiresome it may be to compass a new tune and how easy to lapse into the old airs. And so with new ideas, policies or economies. The old idea is cherished, fondled and embraced until there is jealousy of the new.

Thus when it is shown that a macadam road is *not a pike*, that a macadam can be built for less than pikes have cost, that a macadam costs less for repair and that it is the most economic road, some very good people will not so much as wrestle with the new saying, but, clinging to the old ideal, will argue that inasmuch as pikes are rough, macadams must be rough; inasmuch as pikes are built below frost, macadams must be so built; that inasmuch as the hand-hammered pike has cost as much as \$5,000 per mile, and because of its coarse construction one hundred dollars per mile, annually, for repair, that consequently a machine, crusher, roller-made macadam structure must cost the same (\$5,000 per mile) for the making, and the same (one hundred dollars per mile) for annual repair.

However unhappy the essayist, arguing for better things, may be over this annoying incident, he must be patient under the knowledge that new principles, however beneficent, have never as yet been totally welcome and have ever as yet met with a measure of opposition. He may be hopeful, however, under the lesson that opposition to that which is good dwindles and disappears before honest argument and fair experiment.

It is so easy to assert, regardless of proof, so easy to believe bald assertion when within the line of the wish that is father to our thought, that I invite you, regardless of wish or personal pride of opinion, in a free and friendly way, to watch that my plea for the macadam system is fully warranted and supported by more than simple assertion.

It is becoming usual to call pikes macadamized roads. A macadam road is *not a pike* in that the macadam is infinitely better and less expensive roads heretofore called pikes.

The imperfections of a pike are:

First. In that it is composed of loose stone in its making and repairing. Thus the pressure a pike receives from passing wheels deepens into ruts. A rut once made, although filled and refilled, will appear.

Second. Pikes have been constructed of hammered stone. Hammered stone is too coarse for the best superstructure of roads. The originator of the macadam principal, stated before a committee of the house of commons, that a stone road was saving of repair in ratio with the fineness of the stone used. Thus a bed of one-inch stone would cost in repair of such bed but one-half of that of a bed of two-inch stone.

Again, a pike composed of hand-broken stone may have cost \$5,000 per mile for building, and one hundred dollars per mile, annually, for repair—\$5,000 per mile for building, because the stone was hand-broken, at probably one dollar per perch, and one hundred dollars, annually, for repair, because the superstructure was coarse and loose. Thus ruts are *started* and are expensive to erase. The experience of macadam builders teaches that a rut will *follow* a rut, that is, if a stone bed is laid upon a rutted clay base, ruts will appear in the stone bed directly over those of the clay foundation. Thus one rut in a pike is the predecessor of an endless series of ruts and an endless bill of costs.

On the other hand, a macadam structure avoids these imperfections of a pike in that (first) its superstructure is composed of small stone and stone siftings or chips, and (second) while wheels press the unknitted, loose surface of a pike, and reach solidity within one track at two inches below the general surface, thus forming ruts, the roller used in macadam structure does exactly what wheels do, but further, it presses the *entire surface* of the bed, so far as wheels can penetrate, in ruts, and thus makes the entire bed as solid as the base of a rut. Thus again, a macadam is so uniformly resistant of wheel pressure that ruts cannot be produced in some macadam within a period probably of ten years.

A crusher turning out eighty perches of stone per day will earn in a day, at fifteen cents per perch, twelve dollars, which will easily pay for the cost of running a crusher per day. The difference between one dollar per perch for hand-broken stone and fifteen cents for crushed stone is eighty-five cents. In the realization of this gain of eighty-five cents by use of a crusher, we can reasonably conclude that a macadam ought to be built for less than half the cost of hammered pikes.

Then, again, as to the economy of a macadam over that of a pike. A macadam being virtually rut and water-proof, and continuing so for ten years, what will it cost to repair a macadam per mile, annually, during ten years? I think you will reply, really nothing.

But will a macadam resist wheel pressure for say ten years? In answer we are furnished proof in an eighth-year-old macadam leading from the P. R. R. freight and passenger station, at Devon, Chester county. Mr. Chas. Paiste, superintendent for the Devon Land Company, tells me that this macadam has endured all the traffic from the railroad, being equal at times to two tons at a draft, and yet this macadam has not cost a cent for repair in eight years, and, I saw for myself, has not as yet a rut. The question then arises, this macadam being as good to-day as it was eight years ago, will it not endure eight years more without a cent for repair?

I do not wish to incite a dangerous conclusion by saying that a macadam will be impenetrable for ten years under the passing of unusually heavy crowded traffic. The Lancaster pike has been splendidly macadamized between Berwyn and Philadelphia for six years. The macadam holds its surface under more travel than will traverse an ordinary country road until it approaches Philadelphia, where a very heavy traffic centers upon it and the surface has broken somewhat into ruts.

It would be unfair, however, to cite this as an instance that under ordinary travel a macadam will rut within ten years.

There is another point as to the saving of macadam worthy of honest consideration, notwithstanding the idea is new and apparently susceptible of doubt.

The argument is offered that if a bed of stone is less than twelve inches thick, wheels may cut through the lesser thickness and plow up the earth. We find, however, ordinarily, that wheels do not penetrate a loose bed of stone over three inches. If, then, a loose bed must be twelve inches, a macadam, saving three inches, need not be more than nine inches thick. But even *now* loose stone beds are laid but *ten* inches.

If then, a total hard pan can be made with a six-inch thickness of stone bound by two inches of stone chippings from the crusher, why a ten-inch thickness?

If you will accept my evidence that a genuine macadam will not rut within ten years, then there can be no retention of water and thus little action of frost. Then, too, a clay foundation being arched, gives the strength of an arch to the interlocked compact solidity of the macadam bed. Thus a stone compact, well arched, will again save in material over a flat, loose bed.

Therefore, by reason of the *evidence* I have submitted as to the cost and saving of a macadam structure, I wish to appeal from any impulsive figuring as to macadam roads based upon pikes and costing \$5,000 per mile and two hundred dollars and three hundred dollars for annual repair.

There may be in every township roads of sand loam that cost but ten dollars annually for repairs. It is not fair, again, to make the cost of maintaining such roads the criterion of the cost of maintaining the most traveled and worse clay roads. If the average cost of the dirt roads of a township is, annually, say forty dollars per mile, the lighter sand roads costing but ten dollars, the worst roads or worst parts of roads must cost, in addition to the average of forty dollars, the difference between ten dollars and forty dollars, making, with the difference of thirty dollars added to the average of forty dollars, the total cost of seventy dollars for the yearly repair per mile of the worst roads, or the worst parts of clay roads.

A crusher, truck, belting and roller will cost \$1,200. A threshing engine can be hired and coaled for seven dollars per day, while the wages of three men will not cost over five dollars, making in all twelve dollars. Four townships can pool and own this machinery at a cost of three hundred dollars per township.

If a township owns two horses and carts, one teamster, at one dollar per day, and two teams at a cost of horse feed per day, one dollar, they can haul twenty perches per day one-fourth of a mile on an average, and this for ten cents per perch. Thus if we sum up fifteen cents for crushing, twenty cents for the double haul to and from the crusher, twenty-five cents for breaking or quarrying, twenty cents for rolling, we have eighty cents, and the warrant to name one dollar as the cost per perch of a macadam road. The crusher being portable and stone plenty we may leave out the quarrying and one haul, reducing the cost per perch to say fifty cents. A road ten feet wide and six inches thick, at fifty cents a perch, would cost five hundred and thirty-three dollars per mile.

The people of some townships are favoring this ten-foot wide and six-

inch thick road, for the reason that a ten-foot road abutting against one bank will leave room for a summer road. The summer road being more yielding than the macadam, will be used during the summer, or for six months, to the saving of the macadam, while in dry weather the summer road will *not* rut, and the wear can be repaired at little cost.

Now, a road of ten feet width, six inches thick, where quarrying and two hauls are unavoidable, will cost per mile, at a dollar per perch, \$1,066. If, then, we save on our worst roads—which, of course, we only macadamize—the average of seventy dollars per mile, the saving alone on a mile or ten miles of dirt road will pay for a mile or ten miles of macadam in fifteen years. Should we save annually per mile seventy dollars by macadam structure, from ten miles we would save seven hundred dollars, and in ten years we would save \$7,000.

It actually seems a blind conception of economy to give to waste, in name of saving, \$7,000, rather than place this \$7,000 where the principal can be realized in the appreciated value of farms; where the principal will double, triple and quadruple itself, as time passes on, and where such principal can earn a large dividend in the savings from road repair, speed and draft.

Another unaccountable trait of our business character is that we will pay seven per cent. for the use of a pike in tolls, and probably three per cent. in addition for its maintenance, when we could, by a simple operation that a child will understand, turn this seven per cent. into our pockets, instead of giving it to others and saying how hard the times are.

There is not time for me to illustrate the saving of macadam roads in speed and draft. In all our journeying to the railroad station, to mill, to school with the children, to the town market, to church and postoffice, there is time and draft expended during the coldest days and roughest roads of the year. This, if you will demonstrate with your own pencil, will equal easily two mills on the assessed valuation of your township. And we should remember that these journeyings do not end with a decade.

In order to secure quick returns from the substitution of economic macadam for wasteful dirt roads, we must have capital. A county or township loan would undoubtedly increase the lien on our farms for a time; but my farms in East Goshen, and those also of Captain Roberts, are already obligated for a share of the lien, virtually so, of \$1,400, for the repair thus far in the year of twenty miles of dirt roads in our township, and although some of these roads are now a series of bogs and the money wasted, that \$1,400 must be paid. Otherwise there will follow a constable's sale. Now the building of ten miles of macadam, after the macadam earned its cost, would reduce this lien from \$1,400 easily to seven hundred dollars, and the loan of capital would be the agency effecting the reduction of the present lien.

What would be the lien per acre for capital furnished for building ten miles of ten-feet-six-inch wide road?

Our state includes three thousand districts. There being sixty-seven counties, the average number of districts would be forty-five, without fractions.

Ten miles of macadam road per district would make four hundred and fifty miles per county. Four hundred and fifty miles, say at \$1,000 per mile, would be \$450,000 for the county. As our county taxable property value equals an average of \$23,000,000, \$450,000 for four

hundred and fifty miles of macadam road in the county would be about two per cent. of \$23,000,000.

Now a hundred-acre farm costing eighty dollars per acre would equal a value of \$8,000. The lien, therefore, on this farm of one hundred acres for the ten miles of township macadam would be two per cent. of \$8,000, or one hundred and sixty dollars for the one hundred acres, or one dollar and sixty cents per acre.

Farmers are continually giving ninety-day liens of one hundred and sixty dollars for horses that may die before the notes become due. Is it more distressing to give a lien of one hundred and sixty dollars for ten miles of macadam that will be a blessing to generations in those summers that you and I will never see, and that will be of part of the most revered remembrance of the spirit and beneficence of our generation?

"But," says A. to B., "your farm being along the macadam will appreciate in value more than mine, which is distant from the improvement, and thus I should pay less tax." Of course, if the farm skirting the improvement increases in value, it follows that it will be assessed higher, and the owner must pay more tax, not only for roads but for school and county expenses. Judge Lawrence, of Ohio, says that since the adoption by that state of the free pike act, farms adjoining permanent roads, made under this act, have increased in value twenty per cent., *because* the demand for farms is centered on these all-the-year-round roads.

But, then, this free pike act, without any cognizance of this surety of increased value, provides that owners of farms adjoining the improvement shall pay an additional tax of two dollars per lineal acre within one mile of the improvement, and that owners within two miles shall pay one dollar per lineal acre. The county furnishes the capital and the improvement is made upon appeals to the courts by three-fourths of the number of residents within two miles. This law evidently settles the matter of diverse values, but seems to place the burthen upon a few enterprising citizens, and yet these citizens have a consideration in increased values. If, however, the entire citizenship should appeal for an entire macadam, in such case the burthen would be equal.

Now, what would be the cost under the Ohio system to the owner of a hundred acres, square upon the improvement for a road costing \$1,000 per mile? There would be ten lineal acres for one hundred acres, which, at two dollars per acre, would produce an annual tax of twenty dollars. There are twenty-five lineal acres per mile. This, multiplied by six dollars as tax received from both sides of the road, would produce an annual sum of one hundred and fifty dollars per mile. In seven years the amount of these sums would equal the price of the roads, or a thousand and fifty dollars. The owner of a hundred acres within one mile, paying twenty dollars annually, would pay in seven years one hundred and forty dollars as his share for the building of the mile of road. This product is twenty dollars lower than our estimate, based upon the average valuation.

Thus a natty macadam track costing a thousand and sixty-six dollars per mile, by use of crusher and roller, can be built, interest included, by the adjoining one hundred acres' owners simply handing over an eight-year note for one hundred and sixty dollars within one mile, and eighty dollars within two miles.

Or a ten feet nine-inch thick road can be built at one dollar per perch for \$1,600 a mile, or at a cost to adjoining owners of one hundred acres

within one mile of two hundred and sixty dollars, or within two miles of one hundred and thirty dollars, interest included.

Of course the popular verdict may be for the nine-inch thickness of full stone or the six-inch depth of stone, bound by two-inch surface of chippings. But some may say that a nine-inch thickness is still insufficient, yet with a nine-inch thickness twelve inches can be placed on flats and six inches on slopes. The streets of our town of West Chester are but ten inches, and this for a borough population of 8,000 and virtually for an entire population of a county.

A nine-inch thick and twelve feet wide road would cost at one dollar per perch \$1,920. The period of payment of cost and interest would be sixteen years under the Ohio act, thus the owner within one mile paying yearly twenty dollars would pay in sixteen years three hundred and twenty dollars and the owner within two miles one hundred and sixty dollars. I have calculated upon the Ohio basis because it is truer and more definite than the general average basis.

The people of townships very reasonably think that the people of the towns and that corporate and personal property should share the burthen of township road structure, and this because that trade centers in towns, as is evidenced by the fact that when town trade falls off such falling off is the result of boys' decreasing access to towns. True, boroughs pay the cost of streets, but country folks mainly use the borough streets in business errands that are profitable to the merchant, lawyer, doctor, mechanic and banks of the town. On the other hand, when merchants and other business or leisurely folk of the town drive through the townships there is no moneyed errand favorable to the farmer however gladly the farmer may see them driving by.

Again good public roads being in the same line of importance to the state as are common schools, needing like incentive and policy, the state should be generous in their behalf. This for the same and universally accepted reason upon which our national government fosters, facilitates and protects the traffic of rivers and harbors.

We can remember an instance, if we will, certain stretches of clay roads largely traveled and almost impassable during two months of each year, and this, notwithstanding the use of the best skill that can be secured in a supervisor, notwithstanding the road scraper and the May rounding-up. In fact it is impossible to make such a road a jot less than a nuisance in March and April. While it is heaving and freezing and becoming fathomless with quicksands, the pick, the shovel, the scraper, the skill of the supervisor, no clay road law of Pennsylvania can touch it. The courts may declare it a nuisance and still it is a bog. The disease must annually run its period. Plenty of good-natured advisers say that the action of the frosts and rains of February, March and April can really be stopped by a rounding-up in the fall. This seems equal to catching a bird by putting salt on its tail. But even should the fall rounding-up remedy stop the action of March frosts it seems that a large citizenship would have to be regenerated in order to secure consent to the extra expense of this fall rounding-up, and legislation cannot regenerate anybody; even if there are plenty of liberal township people, and I know there are, they would still doubt as to a fall rounding-up being master over the mischievous elements of a winter. Thus legislating for an entirety of all-the-year-round roads upon a basis of clay seems like blowing a feather against an equinoctial wind.

The township simply will do nothing, though the opportunity is at

hand by the macadamizing of these bogs, to save thousands of dollars and to enjoy the comfort of easy, safe travel, because A. does not want to pay for B.'s macadam, C. is wary of increased taxation, D. is opposed to borrowing capital and E. plows through the mire because forsooth thus plowing the mire was the signal characteristic of his father. Thus we are in a strait, and yet, paradoxical as it may seem, everybody wants better roads.

I ask you to appeal that the state may be strongly wise in plan and so generous in appropriation as to tender such an award for permanent road structure as may be not only an incentive, but irresistible, for a state appropriation effecting good roads will return its many fold to the bank in a better financial standing of the people, to the railroad company, and by reason of the spread of country villas, more daily travel and freightage between country seats and town stores, operas, churches, fairs and so on, and to the investor the appreciation of farm security, to the borrower an easier money market.

The feasibility of constructing stone roads depends upon the presence of stone. While in Susquehanna, roads can be built cheaply because of plenty of stone, in Crawford, because of a scarcity, stone roads will cost more. Now, if, by reason of plenty of stone, Susquehanna desires to build permanent roads, and if by reason of their scarcity, Crawford feels unable to build, Susquehanna evidently should be allowed the option of building and Crawford the option of not building. Thus a law can be made general, giving all our counties or even townships the option of independence of doing as they may elect in the matter, and thus if Chester county shall elect to use of the state appropriation, and may so choose to build roads, York county cannot reasonably deny, because the real estate of York does not pay for the Chester roads inasmuch as the state appropriation is not a tax upon the farmers of York. Thus, if township are given the option by a general law, one township need not interfere with the choice of another township. Then, again, we might go further and determine that if a township shall not elect to build a certain road, then again individuals may be privileged to do so under the Ohio system. Then, still again, should individuals not agree to build, as a last resort, companies should be given the township right of building toll roads, under charter. Of course we want free roads, but if many townships are restrained from building free permanent roads, toll roads will certainly be built. The only way to check toll road structure is to build free macadam. Thus to-day it will be easier to secure a macadam law than ten years hence, and so I think that farmers in their granges and organizations should endeavor more to agree than disagree.

Now, I cannot expect all to agree with my ideas. Because all people may not agree with me, I should be willing to secure for my idea just what I can get and no more, but I should not risk the entire loss of that idea or plan by defeating all other ideas or plans that are not exactly consonant with it. Thus the first effort of all upon the part of farmers is, first, to get a thorough knowledge of the cost and economy of stone roads. Then, as a second step, to come to a generous and intelligent agreement. Then, as a third step, to press your agreement or sentiment upon your road commission and legislators, and as a sequence you will get a result equal to the value of the sentiment you have made. That is if you conclude to ask that bogs be retained, no matter what bogs may cost you, you can have bogs, or if you conclude that you want hard, twelve months roads by stoning your worst roads

or worst parts of roads you can have, upon demand, the plan and sinews by which macadam can built.

If you please, I will recapitulate. A state appropriation in behalf of better roads will be moneys paid by railroads, banks, and corporations generally and also by owners of bonds, mortgages and notes. Thus, if Pennsylvania appropriates money for a road administration and construction, farm owners can freely sanction a generous appropriation.

A six-inch macadam means virtually an eight-inch depth road at the lower cost of a six-inch road, in that it is composed of three layers one of two to three inch rubble, one of an inch-and-a-half stone, and the surface of stone chippings to the depth of two inches. This bed being laid upon a convex, dry surface, and being well packed by using a traciton engine and iron wheeled truck for hauling, will equal a loose, large stoned ten-inch depth.

It is best to allow townships self-choice either for or against macadam structure. Thus where roads are of sand or slate loam the citizens of such township need not build nor can they reasonably impede road structure in another township, where the roads are of clay, and an injury to the public four out of twelve months in a year. By a general law allowing option to townships either to build or not to build, all confusion of opinion and diversity of condition is minimized.

In order to issue township bonds for road purposes there must be an unquestionable basis and authority so as to create an attractive low interest loan. Thus there is legislation needed.

As reapers, binders and mowers cost at one time double their present prices, so when the full economy of road structure is reached, when crushers and competition between contractors is increased and the knowledge is acquired that less bulk of stone is needed, the cost of macadam will be reduced.

There is needed road supervision by bonded experts capable of estimating and enforcing true estimates of costs and of determining between the rights of the people against any unjust claims of contractors. Expert supervision is needed further to insure the most durable, comfortable road for the least sum of money. The cost of a skilled county engineer would be earned several fold in the saving of money, comfort and health to people.

Should the state appropriate annually \$1,500,000 (this would yield an award of four hundred dollars for a mile in each district per year) and allow, in addition, a sufficient sum for the support of a road bureau, the appropriation would be generally accepted, the bureau being composed of experts and, I repeat, our roads would be honestly built, and for a reasonable sum and under the safeguard of state provisions and specifications.

You will pardon me when I say that since talking to the people upon road betterment I have regretted that forty years ago, when a student, the subject of economies was not taught in the schools. I now appreciate the vast loss to the people of the absence of this study from the curriculum of our common schools. After urging a state appropriation for the betterment of roads, good people of ripe years take me to task, urging that I uttered no word insisting that personal property should be taxed on account of road betterment, so I thought it best to continually explain that a state appropriation is an appropriation of personal and corporate property taxes.

As individuals we are more far-sighted than as citizens. We will

pay two dollars extra for a rocking-chair or nine dollars extra for a lounge, or twenty dollars extra for a sulky cultivator or plow, rather than walk. As individuals we find economy in self-rest, self-luxury, without thought of any money profit. But as citizens we cannot always see that a raise of tax for all-the-year-round, permanent roads not only secures health, comfort, luxury, but is an investment equal to that of a building association, creating its measure of wealth in increased farm values, in its saving of waste, time and draft. If forty years ago economics had been a part of our school curriculum, we would have been wealthier as a body politic to-day.

No matter how cruel our roads may be to us, or how they may scandalize us with the shame of lacking even the least modicum of business spirit or christian endeavor; no matter how they rob us more than trusts may rob us, still they despoil, still they take hours away from our comfort and add hours of storms and stinging cold and buffetings to our lives. While it is perfectly right and incumbent to aim our censure at "combines" that bear the price of our products even in time of scarcity and demand, it is equally well to reserve a share of judgment to ourselves in permitting self-cruelty and self-robbery through the agency of bad thoroughfares, by failure to fearlessly stand up and press for a road system based upon a material that can only transform the bogs of winter, the bogs of the coldest, most stormful portion of all the years into fleet, smooth, indestructible roads.

When I go to the end of my drive and see a child the scriptural "least of these," upon whom, under the Divine lesson, the largest pity and protection should fall, rudely jostled by the wretched road, pierced by cold until the tears stream away from his eyes, the journey because of its torture unmercifully long, the gait so slow to the tenderness of the child even to the suffering of the strong; when I often witness such sad sights as these I ask myself: "Am I, or is the state, my county or township to blame?" Truly I am, as *all* are accountable who permit this cruelty without protest or effort to remove it. It seems almost as if this, our year of floods, had come to teach us something that is best for us to know and do, that the day is fast passing wherein we now "strain at gnats and swallow camels."

LABOR *vs.* CASH TAX.

By S. R. DOWNING, *Member of the Board, West Chester, Pa.:*

[Read at the Butler Meeting.]

The taxpayer is not always just to himself. If it is proposed to add a mill to any tax he very frequently and impulsively says, "No," and this without substantial inquiry. Whereas if inquiry, cool and thorough, were made, he might have found that the additional mill called for and used as proposed, must in all reason and in accordance with sure calculation return to him a valuable compensation over and above his investment of this one mill in the shape of tax.

The payment of tax should be considered in the light of an investment out of which should come compensation—profit. If the citizens of a borough or city fail to pay a tax which, economically expended, will

not be commensurate with good government, the citizens of such borough or city must lose from disorder or robbery. The tax must be equal to the purpose sought or otherwise it is wasted as far as it may fail in the accomplishment of such purpose. Thus a community may lose rather than gain from an inadequate tax.

Citizens habitually demand lower taxation. Organizations resolve as against high taxation. And yet there is a broad lack of finding out how taxes should be applied in order that taxation shall be a source of profit and not a waste of money, in finding out whether increased taxation may not be essential in saving loss from inadequate taxation.

Why should I buy a reaper and binder for one hundred and fifty dollars when I can buy three grain cradles for ten dollars? Upon the ground merely of a difference in the number of dollars, there seems in my buying a binder to be a direct loss of one hundred and forty dollars, and this between the costs of the binder and cradles. Why then am I apparently so foolish as to throw to the winds one hundred and forty dollars by buying a binder? I answer that the daily struggle to save and get the most out of my crops has forced into my brain the knowledge that one hundred and fifty dollars invested in a binder will save more in time, in rescue from damage, in labor and cost of expert work, and thus waste of money, than ten dollars expended in cradles, and this notwithstanding that one hundred and fifty dollars is a tax fifteen times greater than ten dollars.

As to the road question, we are apt to esteem that the perfection of economy lies in a reduction of taxes. Now a reduction of taxes may be literally a waste of such taxes, following the fact that a profitable investment or an economy cannot be reached without an adequate principal. And so, instead of crying wholesale for less tax and even hunting political office on this score of decreased taxation, had we not better and bravely inquire whether, say, our low road taxes are not lost because of their inadequacy? Or, again, had we not better see even that a low taxation cannot be made at least of some advantage by being more economically applied?

Canvassing the matter of economy as between a labor and cash tax, I would call attention to the well-known fact that roads are destroyed for want of timely drainage. Such loss or destruction very frequently occurs close upon the heels of the annual May or June round-up. This loss occurs simply because, so far as our eastern counties are concerned, farmers cannot leave their farms to drain the roads at proper seasons—at times when one stitch will save nine. The cost of the nine stitches that one man paid in cash might have been saved by the one stitch of timely labor and which cost the untimely labor of ten men.

To illustrate a practice usual in parts of our eastern counties under the labor-tax plan, farmer "A." in order to speculate somewhat under the opportunity afforded by the labor-tax plan, will hire a common idler at seventy five cents a day to work out his ("A.'s") road tax. The township credits "A." with one dollar and twenty-five cents per day. "A." boards his road substitute with a set-out of pork and potatoes that does not cost him over twenty-five cents per day. This allows "A." a profit of twenty-five cents. "A.'s" man is worth in work per day but fifty cents. Thus fifty per cent. of the taxes paid by citizens less board is wasted on "A.'s" fifty cent man.

While "A." may think he gains twenty-five cents over his neighbors simply because even the worst farm labor could not be spared from farm work, "A." too must share in the loss consequent upon poor work

at high wages as well as the loss from lack of timely drainage, as well as the loss of the nine stitches in the neglect of the one, for "A," as other farmers, cannot spare even his inferior farm hands at no time of the year to work on the roads.

But "A." after all pays his workmen *in cash*. He pays him seventy-five cents down for fifty cents work, and this in the name and under the costly citizen's right of working out taxes.

Why should not "A." instead pay cash at once and as well to the supervisor and thus enable the supervisor to offer the inducement of a long time, effective employment, together with cash wages to workmen who will earn such wages by returning its equivalent in labor and skill? Would not this be a better tax investment for "A." and for his entire taxpaying community than hiring an idler and charging himself as a taxpayer one dollar and twenty-five cents for these idlers' fifty cent work.

The history of one road is the history of all.

The supervisor of one of our townships in Chester county was notified, during last spring, by the district attorney that a certain piece of road was dangerous and must be repaired. It had been dangerous for three months. The supervisor complained that farmers were entitled to a labor tax and could not work until after corn planting. The notice of the county officer, however, must not pass unheeded. Thus five men and four horses must be taken from valuable farm work for over two days. The cost of repairs was twenty dollars, while the road could have been kept safe and good by a seasonable draining and filling at a cost of not over five dollars. Thus there was not only fifteen dollars lost, but a loss to the farmer who must neglect his plowing and planting in order to work out his road tax—a loss which his road labor could not make up or equal in dollars and cents.

This instance, which is but one of many, indicates a loss of value or of cash in a ratio of four to one as between neglect of roads and instant repair. Thus it may be safely concluded that instant repair should save a township at least one out of four, or one-fourth of that which is paid under the destruction of roads by neglect. This, however, is not the entire loss. Take the annual road tax of any township of our eastern counties running from \$1,300 to \$1,700. Say the average is \$1,500. Of this allow one hundred dollars for bridging and two hundred dollars for teams, and we have \$1,200 as wages. Now it is evident that four good workmen, saving the roads from destruction, and all the cost of destruction that occurs under the labor-tax plan, could do all the lesser work of draining and filling in eight months' work, an ounce of prevention costing far less than a pound of cure. I beg leave then to present the following statement, showing the probable difference in entire saving or cost of the two systems as to this township: The township credits for work done by, say thirty-eight men, working out their taxes in the short space of one month, and mostly after cornplanting, under the labor-tax plan, for wages, at one dollar and twenty-five cents per day, \$1,200. A cash system would cost, by its ounce of prevention, the wages of four men at five dollars per day at one dollar and twenty-five cents for eight months' time in drainage and filling, seven hundred and ninety dollars, leaving a balance in favor of the cash system of four hundred and ten dollars.

Again, say that "A." of the township pays twenty dollars as road tax under the labor plan, then by the cash plan he saves of his twenty

dollars as four hundred and ten is to 1,200, or six dollars and seventy-five cents.

But it is costing "A." seventy-five cents for service lost to farm. He works out the wasted six dollars and seventy-five cents, which requires five and a-half days. Five and a-half days at seventy-five cents per day would amount to four dollars twelve and one-half cents. This four dollars and twelve and one-half cents added to six dollars and seventy-five cents loss under the labor-tax plan would make a total loss of ten dollars and eighty-seven and one-half cents.

If this statement is too extravagant, suppose we make an extravagant compromise, cutting it down fifty per cent. This still leaves a gain to "A." under the cash plan of five dollars and forty-three, or over twenty-five per cent.

This computation is an approximate, based upon prices and values in vogue in eastern counties, and I can assure you that its outcome was as much a surprise to me as no doubt it is to you. In fact, though figures do not deceive, they sometimes seem so extravagant as to shock us into incredulity. If the figures give "A." a saving by the cash plan of ten dollars and eighty-seven and one-half cents, or more than half his tax under the labor system, we can believe at least half their story and credit the cash system with a cash saving of twenty-five per cent.—a luscious dividend worthy of an unbiased seeking.

We must remember in every computation that labor on the roads means just as equally *cash* out of pocket to any farmer who aims to make money out of his farm by keeping it clean, productive, well fenced and housed. Therefore we must cast the balance between the cash value of labor on the road and the cash value of labor on the farm. If we neglect a bunch of weeds by loss of time given to roads, the next year a field may be covered. If we neglect a drain, a brood of chickens, lose a day in planting or sowing, or gathering, or cultivating, or building, or repairing, we will find that there is loss in cash equal, if not more than equal, to any high-rate wages we may pay in hand to expert workmen for the maintenance of roads. This is our status in eastern counties where we have dairies and must care for, sow crop and gather with little skilled labor and only suitable days in which to work.

Labor on roads is with us cash out of pocket. Thus labor tax may be considered as virtually a high-rate cash tax and nothing less.

The "cash system," while it gives the township the choice of suitable workmen, does not mean essentially the employment of persons outside of the township. Any good road workman, farmer or otherwise, living within the township, and who can be called upon, when needed, to stop the waste of roads, can be hired. He receives his wages in dollars and cents, just as he pays his taxes in dollars and cents. The cash system means, then, cash received as well as cash paid. But even a cash payment may not induce a good farmer or workman to lose money by neglect of his business.

If we adopt the contract system, under specification and with surety requiring the constant drainage and instant repair of roads, that is all right and the only way a road contract should be made. The contractor can live in the township, be a farmer, and can select the most expert workmen of the township. But the contractor must pay and receive cash, and this that he may fulfil his contract and save his bail. No contractor, under specification and surety, could depend upon the labor-tax system, could depend on inferior and irregular workmen or boys. No contractor will risk the greater destruction of roads or the continu-

ance of dangerous roads by waiting upon the little time that farmers owing tax can spare for repair. When a road needs drainage to save its destruction and the further money loss to himself, a contractor must instantly have good men, and in order to have good men promptly he must pay cash, as otherwise he cannot secure them.

And so to sum up this inquiry under the labor system we give labor as tax—labor which means after all indefinite cash payment—one workman being worth, and therefore giving, but seventy-five cents in labor per day, another workman alongside being worth and yielding one dollar and a quarter in labor per day, and yet both laborers being credited equally and thus unfairly. On the other hand, under the cash system the tax payment can be graduated, for while one man's labor may not be the equal of another man's labor, one man's dollars is no more nor less than another man's dollar, and the dollar must be equally earned. Under the cash system then the work accomplished can be made to equal the tax paid.

Under a cash payment one can use the contract system, with surety for all requirements consistent with economy and safety. Under labor payment there can be no practical, economic, effective contract.

Under the labor system the labor that we give to roads is cash lost to the farm equal, if not greater, than cash gained upon the roads.

Under a cash payment the instant drainage of roads, costing little, will save the usual annual destruction of roads costing easily three times more than their repairs.

Under a cash payment the choice of the best workmen will insure the prompt complete accomplishment of the little repair that is needed under timely attention. Cash payment will thus materially cut down the number of workmen and amount of time employed under the labor system and secure better workmanship.

Under the cash system the workmen, being few in number, expert and reliable, can be directed to the best advantage and under a supervision close to every detail of the work, while under the labor-tax system the supervision of the yearly May picnic, including forty men and boys stretching over half a mile of road, with the scraper miles away, is a costly delusion.

Under the cash system wages can be scaled without offense to the electors of road officers.

Under the cash system we can have better roads at a less cost than the poorer roads by their neglect under the delay of the labor system.

And yet withal, notwithstanding my argument, so zealous, if not so strong in favor of a cash tax, there is, to be honest, one hindrance that may not be argued away. It is claimed that in some sections farmers cannot pay a cash tax, not having the money. This is sternly true, but however true, does not disprove the saving of the cash tax over the labor tax. If a man has capital he can realize money out of it. If a community has the cash with which to pay its road tax, money can be made by thus using its cash or capital. In many, many other things money is lost for the want of cash or gained by the reason of having and using it.

But the fact that farmers in parts of the state are unable to pay a cash tax disposes at once of any obligatory law compelling cash payments.

The road committee of this board, of which the highly educated, generous, christian gentleman, David Wilson, was Chairman, referred pointedly at Lewisburg to the inability of some sections to pay cash

and while urging, first, that the road tax should be paid largely or wholly in cash, the committee urged, secondly, "that the local option feature should be clearly embodied in the law, for," said the committee, "this inability to pay a cash tax must be borne in mind by whomsoever any road law may be formulated."

It seems to me that on these two recommendations of this committee hang all the law and prophets as to our various circumstances, needs and abilities as a state body. An option law would give a freedom, helpful and yet harmless—the freedom to pay fully or partially in cash; the freedom to contract our roads under surety and specification; the freedom even as a township if it so wills, and as has been done, to toll its permanent roads so that all using them, wherever from, shall pay for such usage; the freedom to borrow money for the structure of metal roads, even as money is borrowed for school buildings—roads that will pay double their cost within a generation or the freedom to adhere to old plans and practices; the freedom to do all that we are able to do and only so far as we are able.

Thus one county need not impose upon another county what it does not want nor need one county impede another in what it does want and actually needs.

But can a general law be made thus optional?

It seems to me that act No. 140, passed by the last legislature as recommended by this board, was clearly an optional measure, authorizing road commissioners "at their option" to purchase road machines; and in the second section of the act giving road officer the freedom to collect or not to collect twenty-five per centum of the rates in cash for the purchase of machinery, using distinctly the word "may" and avoiding the word "shall."

If, then, this law of 1887, not being obligatory, is an optional law; if this law passed the legislature, received the assent of the Attorney General and the signature of the Governor, and if, not least, there has been no breath of objection to it, no question of its constitutionality upon the part of the entire citizenship of the state, then is not this law of 1887 so unquestioned, so acceptable a precedent that we can safely legislate in accordance with the various needs, desires and abilities of the citizens of our commonwealth?

The question of labor or cash payment is worthy of manly, straight thought. Every taxpayer owes it to his pocket, if nothing else, even to his selfishness, that he shall put aside vain imaginings and thoroughly, honestly, impartially investigate the subject; vain imaginings are very, very costly. Some will say, "there is an axe to grind;" some will say again "there is a political trick somewhere." Others will believe all these sayings and spread the belief. Thus repeatedly reforms that will even put money in men's pockets are blocked and thus the old Bible is carrying the two words "vain imaginings" from everlasting to everlasting, because "vain imaginings" are ever and ever sinfully blocking cool, insertive thought and cursing us with burdens we need not bear.

ROAD POINTERS.

By the SECRETARY.

In the following pages we have endeavored to collect in a condensed form convenient for the general reader, the leading points brought out during discussions at the general meetings of the board, at local farmers institutes under the care of the board and at agricultural meetings at which this question was the leading topic considered. Neither the board nor its secretary should be held responsible for the views herein expressed, as the object is merely to present the views of all, and not those of any individual or body of men :

1. That, taking into consideration the present depressed condition of the agricultural interests of the commonwealth, and that the burden of road repairs and improvements necessarily under our present method of taxation falls upon the farmer, it is not wise to formulate any scheme of permanent improvement which will be followed by an increase in the amount of the *local* tax levy.

2. That there can be no permanent improvement without either a more economical expenditure of the taxes now collected, or an increase in the amount levied, and that any plan having any other basis must necessarily fail.

3. That by including all kinds of profit-bearing investments in the tax levy (at least for road purposes) an additional amount sufficient to cover all practical permanent improvements may be secured. And further that the extension of the levy so as to include all classes of profitable investments will not be unfair, because the banker with a country residence, the merchant, the doctor and all classes are equally interested in having good roads, either for pleasure or for profit.

4. That no system or state department of public roads should be created, and that all expenditures from the state treasury, which may be deemed necessary for the permanent improvement of our public roads, can be distributed by officers already commissioned and through channels already created ; but that it may be wise to create a county official who shall in some way have charge of the distribution of all state funds appropriated for road purposes.

5. That any appropriation made from the state treasury should only be used for improvements of a strictly permanent kind, the character of which should be clearly defined by the law making the appropriation.

6. That a state appropriation for this purpose is advisable because direct taxation would result in an unequal, and in many cases, an unfair distribution of the increase, because certain localities would be largely the gainers, while others would lose the benefits of the increase. And that if corporate property is assessed by direct taxation and collection, the increase would be greater in some sections than in others.

7. It view of these and other arguments which were deduced it was thought best that the increase should be in the form of a state tax, payable, first, into the state treasury and afterwards distributed upon some equitable basis without regard to the rate of payment by localities, and thus insure a fair and equitable improvement of all public roads and not of those in certain favored localities.

8. That state aid might very properly be distributed upon the basis of the present or succeeding tax levies, thus giving the greatest amount of assistance to those localities which were doing the most to assist

themselves. And that, as a rule, those localities which were now levying the largest amount of road tax, would, and should be, most benefited by such a distribution.

7. That the present tax levy, if paid in cash, and expended upon a strictly business basis, would retain the roads in their present condition and leave a margin for permanent improvement, without any increase in taxation either state or local. It was estimated by practical men that the present tax levy, at least in many localities, if paid in cash and expended only for the best kind of labor, would accomplish nearly double the amount of work now obtained from it.

8. That more attention should be given by township officers to *permanent* improvements in low and wet places, and that if the money which has been expended on such places during the past fifteen years had been laid out in strictly permanent improvements, the present tax levy might have been materially decreased without detrimental results.

9. That in the opinion of many the defects of our present system were to be found, not in the law, but in the manner in which it was carried into effect, and that this was largely due to a defect in public opinion which would not uphold a local officer in performing what he knew to be his duty and for the permanent interest of the taxpayers of his district. And that in many cases, the success of the supervisor was measured, not by the actual condition of the roads, but by the balance that he could leave in the township treasury at the end of his term or the working season.

10. That when properly enforced the act of 1836, would give any locality in the state excellent roads, and that therefore it was not necessary to make any radical changes in our general road law or road system. The discussions at the meetings of the board plainly proved that in very many cases the taxpayers had but a limited idea of the power which the Act of 1836 confers upon the supervisors and local officers.

11. That the present levy for strictly road purposes, did not exceed (in reality) from three to four mills, and that in most cases where an excess above three and one-half mills was reported, it was found that the difference in valuation was responsible for the variation in the amount levied, or in the mill rate, and it was believed that if all the property in the state, now taxed for road purposes, could be assessed upon exactly the same basis, there would not be a very material variation in the rate of taxation for road repairs.

12. That in many counties, the reported bad condition of the public roads was largely due to the habit of putting all the work on them during the spring or fall, and almost utterly neglecting them at other seasons of the year; and that it would be found economical to in some way inaugurate a system which should provide for a more constant and regular system of repairs and supervision; and that labor expended at other times would leave the roads in a condition requiring less labor at the time of the usual spring or fall "mending."

13. That in many cases the present width of the roads operated against their economical and proper repair; and a case was cited in which the legal width of a long piece of road was fifty feet, a width which almost rendered it impossible to move the earth from the side ditches to the middle of the road, or if this object was accomplished, it so increased the expenses that the extra width was a useless expense. It was claimed that thirty-three and one-third feet was, except in the case of deep cuts and other special cases, ample to ensure a good road

bed, and that side roads and those not generally traveled need not be even that wide.

14. That any law governing the expenditure of state funds and the permanent improvement of our highways should not specify the character of these improvements, except in a general way, because a permanent improvement which might be practical and economical in one locality might be impracticable in another, or if practicable, might not be practical on account of the cost of construction. And that it would be against public policy to specify macadamizing as the mode of improvement because it was impracticable in very many localities.

15. That in essays read at the meetings of the board and at local farmers' institutes the estimates for macadamizing roads were based upon an insufficient width and upon an insufficient depth of the macadam material, and further that they were, in nearly every case, calculated from a stand point at which the macadam could be obtained at a minimum cost. And that these estimates could only be accepted as good for a limited portion of our state.

16. That the cost of macadamizing, even at the low rate of the estimates furnished at meetings of the board, would place the work beyond the reach of the average township road fund and would effectually prevent its general adoption. And that at some of the local institutes it was shown by practical men that the average township road even in favorably located districts, could not be macadamized for less than \$2,250 per mile, with an annual allowance for repairs far exceeding the estimates given in the reports of the board.

17. That at one of the meetings of the board, it was shown that the annual cost per mile of repairs on the *turnpikes* of Lancaster county was about one hundred and fifty dollars per mile, while the average annual cost of the present system of roads did not exceed thirty-five dollars per mile.

18. That, on the other hand, it was claimed that there was a great difference, both in first cost and in annual repairs, of a turnpike and a macadamized road, and that the latter not only could be constructed for much less per mile, but that it was better in every way, and that the repairs to a well-constructed macadamized road was far less than those of the ordinary turnpike.

19. That the proposed plan of authorizing the issuing of township or local bonds for road improvements, was dangerous and not to be encouraged. That it would open the door for much fraud and throw a great responsibility upon local officers usually not elected for duties covered by such responsibilities. And that the ease with which the funds were apparently obtained would result in extravagant expenditures the most of which might have to be met at a time of depression and financial reverses.

20. That probably the most feasible plan for permanent improvement, at least until some general plan was formulated, would be to expend a portion of the present tax levy in the permanent improvement of low and wet places, and thus by degrees raise the average of each section of road to a general condition. It was claimed that an increase of but one mill in the local rate, would, if expended in this way, work an unexpected amount of improvement within the next ten years, and that the extent of the load was measured, not by the best portion of any section, but by its worst spots, and that it was often the case that it was impossible to move a load on level places, which could much more readily be taken up the steepest grades on the section of road.

21. That in very many cases the expenditure of ten per cent. in the amount now used for repairs, in a well-constructed drain in the middle of, or alongside the board, would ensure a comparatively good road at all seasons of the year, and by the rapid removal of the surplus moisture would so reduce the cost of annual repairs that the average expenditure for ten years would be materially decreased. At least one case of this kind was cited and there is no doubt but that there are many more which might have been given.

22. That in many cases, the natural wearing down of the hills was prevented by the presence of "breaks" or "cross-ways at the tops of the hills and their entire absence on the levels near their bases. Cases were cited in which the removal of a cross-way at the top and its removal to the bottom of a hill, had, in ten years, very materially decreased the average grade of the hill. In this case again the weight of the average load is governed, not by the lowest nor by the average grade, but by the highest grade on the road, which is usually found at the "cross-way" at or near the top of the hill, and just at the time when the team is least prepared to bear an extra strain.

23. That in many cases if the amount, which will be found necessary to macadamize a given piece of road, was expended in cutting down and grading the hills and filling up the low and wet places, a greater benefit to the public would be obtained and with no cost for increased annual repairs of any kind. Cases were given in which the expenditure of from ten to twenty dollars in private funds or by coöperative labor of a few neighbors, had so materially reduced the grade that all loads taken of a section of two miles or more, could be very much increased without much additional strain upon the team.

24. That the laying out, construction, and repairing public roads was a business which should be thoroughly understood and which the results of practical experience were quite as valuable and economical as in any other system of public service, and that therefore frequent changes in road-supervisors, or political influence, were to be discouraged. By some it was claimed that while practical engineering might not be absolutely necessary in the township officer, there should be some county officer to supervise and direct the laying out of all new roads, and that for the purpose of securing uniformity in township or local repairs, the county officer should, in some way direct, all extensive local-repairing.

25. That the systematic use, under proper supervision, of improved road-repairing machinery would very much reduce the cost of annual repairs, and that this decrease would be greater each year, because as the shape of the road, by the use of scrapers and other improved machinery, would gradually accommodate itself to the proper form for economical repairs, and that in the end machine-repaired roads would be found far the most economical.

26. That the increase in the number of patents, the improvement in the older machines, and the lowered cost of construction, had so decreased the cost of scrapers and other machinery as to placed them within the reach of the most limited township fund, and that in many cases it would be found most profitable for the township to own several, the use of each of which should be restricted to certain sections of the township. It was claimed by those who had considerable practical experience in the use of road scrapers, that a good scraper, with three men and four horses, would accomplish more than twenty-five men with shovels, in the ordinary manner of repairing roads.

27. That the present power given supervisors of levying one-fourth of the road tax in cash for the purchase of improved implements was a move in the proper direction, and clear proof of the economy of collecting the remainder of the tax levy in cash. And it was shown that by utilizing the teams of adjacent farmers and taxpayers, at times when they were not otherwise employed, the cost of repairing the roads could be reduced to a minimum. In this connection it was suggested that it might be found best to place some restriction upon the use of the team of the supervisor, so as to distribute as evenly as possible the right to work on the roads.

28. That in the opinion of many, much of the present difficulty found in repairing the public roads is due to a constant change in officers and to a divided authority, and to remove these causes it was suggested that the number of supervisors be reduced and as an encouragement to the proper class of men to take hold of the office, the present pay should be divided among the decreased number, and that ability, and not political favoritism, or inability to successfully manage private affairs, be made the criterion of selection. And that efficient men be retained in office because they are efficient and not because they either lower or increase the tax levy of the township.

29. That in very many cases, the amount now expended in laying out new roads, often for the benefit of one or two individuals, if expended in the improvement, by grading hills and filling up low places, of our present roads the *general* travelling public would be the gainers although private interest might suffer more or less. Cases were cited in which from \$2,500 to \$3,000 was expended in a new road to avoid certain hills, when the expenditure of a smaller amount in reducing the grade of the hill, would have given the public a much easier road, and one which could be kept in repair at a much less cost than the one on the low ground of the valley.

30. That in laying out and constructing public roads, more attention should be given to the benefits to be conferred upon the traveler and less to the wishes of individual property holders, and that in many cases roads laid out in certain positions to avoid heavy damages, were not economical because the increase in the cost of the annual repairs exceeded the saving, during the first fifteen years after construction. Other cases were given in which the traveling public had been compelled to traverse a distance of a quarter of a mile more than was absolutely necessary, in order to avoid damage to a single landowner; in such cases it would be far better to pay the increased damage than to increase the distance travelled, for in that case the evil would stop with the payment while in the other it was endless.

31. That the system pursued by our leading lines of railways and by our cities in the repairs of their track and streets, might with profit, possibly with some necessary modifications, be applied to the repairs of our township roads. That, in addition to general repairs by the township officers, adjacent landowners might be assigned certain sections, carefully specified, to keep in repair in cases of small or unexpected damage by showers and local causes. Thus when the water was running in the middle of the road it could be turned out before the damage was great and before the attention of the township officer could be directed to it. Cases were stated in which the hauling of a few logs inflicted damage, of an unusual and unexpected nature, which if neglected a week or two would have caused a great expense for repairs, but which if noted and repaired at the time would have cost but little.

32. That it might be found profitable for the township officers to keep a few men at work on the roads all the season, during proper weather and that thus by constant supervision, they could prevent greater damage and consequently greater cost for repairs. Cases were given in which from six to eight men, employed constantly on the roads, accomplished more than ten times that number employed spasmodically and without proper supervision and direction. The skill obtained by constantly working at this class of work was also given as an important benefit to be obtained by the adoption of the plan.

33. That it is possible to permanently improve our public roads and apportion the expenses among adjacent property owners in proportion to their direct interest in the improvement; or, in other words, to assess the cost in proportion to the benefit derived from the improvement. It was claimed that this plan was found practicable in Ohio and that a good macadam road to the nearest railway station would, at least in many cases, increase the value of a farm fully five dollars per acre. Under the Ohio law, the cost is assessed at a fixed rate per acre and the rate is regulated by the distance from the road to be improved. No improvement can be undertaken except on the petition of a certain number or proportion of the taxpayers of the locality directly interested.

34. That the demand for permanent improvements and for better public roads is strongest in the southeastern part of the state and in the neighborhood of the larger cities and towns. It is further claimed that the citizens of these towns and boroughs, who drive into the country, are as much interested as are the farmers, and that they should therefore pay their proportion of the expenses; to meet this contingency the laws in some cases make it the duty of the town or borough to assist in the improvement of all roads within a certain specified distance of their extreme lines.

35. That there are many communities which would be willing to properly meet an increased tax levy for road purposes if assured that the increase would be economically used in the construction of improved roads, but they are not willing to pay an increased tax for repairs under the present system. Practical men have, at our public meetings, assured our board that their constituents would willingly pay any reasonable tax if they could be assured that it would be economically expended in practical and permanent improvements, but that they were opposed to the construction of public roads by private capital for the purpose of charging toll, but approved of the gradual absorption by the state or county of all turnpikes and toll roads now in existence.

36. That much of the dissatisfaction expressed at the condition of the public roads during the past year, is due, not to any real increase in their bad condition, but to a combination of circumstances which may not occur again for many years; and that this combination includes long continued bad weather during which the roads become continually worse and to the absence of our usual winter's frost to keep them in a hard and solid condition. Or that, in other words, much of the trouble was due to the presence of an unusual amount of water and the absence of the usual freezing weather.

37. That the adoption of a general system of road repairs and construction was almost impracticable so long as our present local laws and their accompanying disjointed system, were tolerated and that one of the first moves towards any improvement should be a complete revision and modification of our present laws. It is also admitted that the new constitution presents difficulties which will seriously interfere

with the adoption of a general road law sufficiently elastic to suit all localities and all cases; and that in view of this fact it may be found best, at least for the present, to confine all attempts at improvement to a modification of our present law of 1836 and the repeal of the remaining obnoxious portion of the act of 1834.

38. That comparatively very few farmers really appreciate the direct benefit of improved or macadamized roads in the transportation of their crops and products to the railway station, and that they fail to appreciate the direct benefit to them of a road which will enable them to increase their loads thirty per cent. In order to impress this advantage upon the farmers of New York one of the plans proposed for road improvement in that state, contemplated the construction of short pieces of good macadamized roads in different parts of the state so that those using them could better appreciate the benefits of good roads and the poor economy of bad ones.

39. Many of the plans proposed at the meetings of the board, while they may suit certain localities very well, are not capable of an extension to the whole State. Thus the plan of having each landholder keep in repair the roads running through or surrounding his farm, would not be practicable in many portions of the State in which there are no inhabitants and where the land has little or no value except for the timber either standing or growing. In other cases lands are settled by tenants who have little or no interest in the land or locality and the taxes are necessarily paid in cash.

40. The discussions at our local farmers' institutes and at meetings of the board, clearly indicate that there is much misunderstanding as to the rate of taxation for road purposes in different portions of the state; in some cases this rate has been stated at less than four mills and in others as over nine mills; these two extremes, if no careful investigation is made, would indicate a great variation in the levying of road taxes. We think that careful examination will show that most of this variation is due to a difference in the mode or rate of appraisement; in some locations real estate is appraised at near its actual value; in others it is appraised by not more than one-half of its actual value; this variation in the assessment would make the difference (very nearly) between a four mill rate and one of eight mills and both would raise about the same amount of funds from a given area of property.

41. That the substitution of wide for narrow tires, would, in most cases, result in a great saving not only in the annual repairs to our roads, but also in the wear and tear to the team; and that this gain results as much on the general work of the farm and on the farm, as in the hauling on the public roads. At some of our institutes, it was strongly advocated that the width of the tire should be proportioned to the amount of the load and that it should be regulated by a general law; a still more practical suggestion was that all toll roads should charge in proportion to the weight of the load and the width of the tire.

42. That any general law relating to permanent improvements in our public roads should not specify the nature or character of the improvements; it being held that while macadamizing might be practicable and profitable in certain counties, it would not be equally so in all, and that in some counties other forms of permanent improvement might be more economical and satisfactory. It was also claimed that much of the existing difference of opinion was due, not so much to the want of a general desire for that improvement, as to a disagreement as to the proper methods and manner of accomplishing the result.

43. That the planting of trees along the public roads was, at best, of but doubtful utility and that any possible gain from the shade was more than counterbalanced by the ruts formed by decaying roots, which by holding the water, would gradually increase in length and depth until they became a serious hindrance to travel; it was claimed that the proper place for trees was in clumps and plots on ground not suitable for ordinary crops and that any law protecting them or encouraging their planting along public roads should be repealed.

44. That but few farmers fully appreciate the advantage accruing to them from a close proximity to a solid and permanent road; nor do they appreciate the increase which will be given to land by the construction of a macadamized road in the neighborhood. It has been estimated that the products of the farm can be marketed at a decreased cost fully equivalent to thirty per cent. when they can be hauled to the railroad station over a macadam or other improved road. In Ohio this is so well understood that macadamized roads are constructed with funds obtained from a legalized levy upon adjacent property, which, in some cases, is raised in value fully twenty dollars per acre.

45. That in many portions of the state, the hauling which does the most damage to our public roads entirely escapes all taxation for their repair; thus it was shown by one correspondent in the western part of our state that one single interest, that of oil production, amounting to about \$4,000,000 annually, entirely escaped taxation for road purposes, but that this very interest, by heavy hauling, damaged the public roads of the district to a greater extent than the combined hauling of all of the farmers in the district. If this interest could be reached by the same ratio of taxation as is applied to the farmers' capital it would give about \$8,000 per year for permanent improvements.

46. Objection was made to the proposition that each farmer should in lieu of road tax, keep in repair the roads adjacent to or running through his property, and a case was stated in which a farmer paid \$105.28 of road tax while all the roads running along or through the land thus taxed were repaired at a cost to the township of but forty-six dollars and forty cents; other cases were noted in which this plan would have proven equally objectionable and unfair.

47. Considerable complaint is made by taxpayers living near the boundaries of our state, that teams from adjoining states, often engaged in heavy hauling, damage the roads to a great extent but, by being domiciled in another state, entirely escape taxation; as an offset to this it was claimed that the same might be claimed as to Pennsylvania teams hauling in other states and that any system which would remedy the evil would lead to retaliatory measures which would after all about equalize the evil complained of.

48. Incidentally it was frequently claimed that much injury was done to public travel by the encroachments of farmers upon the area given up to public travel; and that in many cases, especially near the farm buildings (when they were situated along the public roads) the width of the road was seriously circumscribed by wagons, carts and agricultural implements, which not only directly interfered with public travel, but also had a tendency to frighten horses and thus indirectly cause injury. It was shown by such members of the board as were versed in law, that every traveler along the public highway had a remedy against this kind of encroachment and that no one had the right to in any way decrease the width of the public road or to place without its

limits any object likely to frighten horses ; and further that any person so offending was personally liable for all damage done.

49. Throughout all of the discussions before alluded to the opinion appeared to be universal, that the ordinary repairing of the public highways should be left under the local control of the taxpayers and that if any permanent improvements were to be authorized, their character should be plainly specified by law, and the local supervisors be permitted to work out the problem in the best way possible. But it was the almost universal opinion that any specification as to the character of the improvements should, in some undefined way, leave something to the local taxpayers for their decision.

50. A decision quite as universal was that if all kinds of property could be taxed for road purposes that no state aid would be necessary in order to obtain permanent improvements of the better class. And that, with the present mill rate, the taxation of all kinds of property would give an increase ample to complete, within a reasonable time, the desired improvements.

STATE AID FOR PUBLIC ROADS.

By S. R. DOWNING, *Member of the Board, West Chester, Pa.*

[Read at the Wellsboro' Meeting.]

Section first, article tenth, of the constitution of 1873, reads: "The general assembly shall provide for the maintenance and support of a thorough system of public schools, and shall appropriate at least one million of dollars each year for that purpose."

Since the adoption of the new constitution in 1873, the appropriation for schools has increased to the present annual sum of two millions of dollars.

And yet in 1834 and 1835 when the question of accepting the common school system was submitted to the delegates representing the school districts of intelligent Chester county, a considerable majority in both years voted *not* to accept.

When the office of county superintendent was established, it also encountered opposition virtually based upon the same argument used to-day against competent county supervision of roads, one class said it would multiply public offices, another class deemed the office useless and the money paid to the officer would be better expended by adding it to the school fund. So that between the years 1834 and 1890, a vast revolution has occurred in the public mind as to schools. State appropriations have passed from thousands to millions, the offices of state and county superintendent being created, and county institutes encouraged by bounties, all primarily in the teeth of popular dissent and by the gradual yielding of popular opinion.

It is pleasant sometimes, and especially in a "good fight," to be reminiscent, and in some instances too, to know that history repeats itself. and beyond this again to learn perhaps, in that economical knowledge grows with the years, the struggle for better things in newer directions may be less severe and of shorter duration to later generations. True, this side the millenium it seems that in all good movements, struggles must need be. Indeed it would be hard to dis-

tinguish the merits of such force and statesmanship as that of Thaddeus Stevens, who won the name of "Old Commoner," and a lasting, grateful remembrance by his advocacy of the first form of our present educational system, it would be, I may repeat, hard to catch the wonderful and happy example of such men, were it not for the showings of these struggles that must ever be in our reach after better methods and conditions.

Should we canvass the matter honestly, I believe we will readily conclude that if a state can appropriate money for schools, it can, with the same ease and upon the same basis of right and demand, appropriate money for roads, and that after all, the greatest difference between the propositions, is but the spelling of the word "school" and "road" so far as an appropriation is concerned.

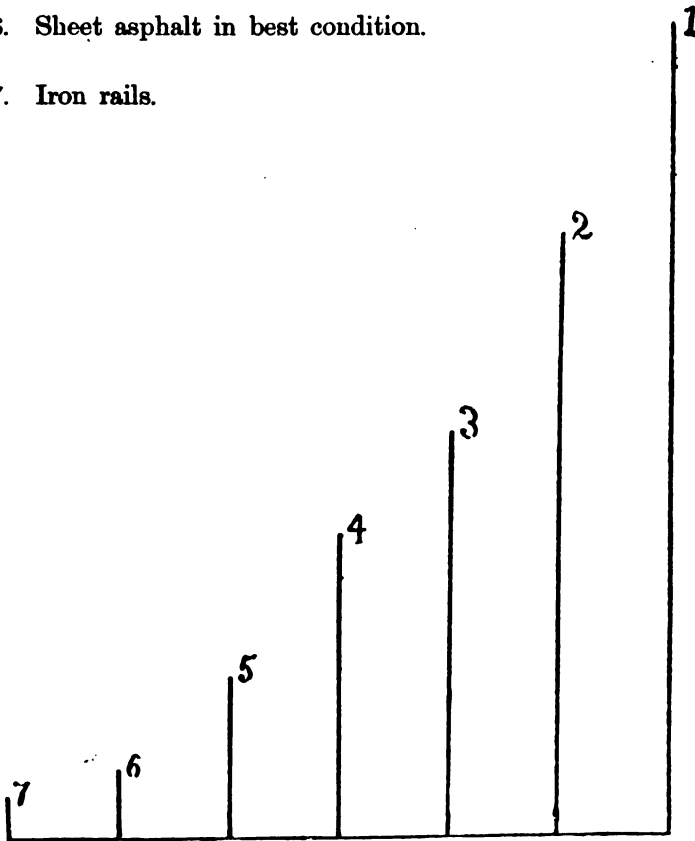
An appropriation for schools is mainly money expended as consideration for a value received, and that equally received by an entire public. Thus money expended for a proper laying out, structure and maintenance of roads would be a like consideration for value received by the general public. The appropriation of money for roads has little, if anything, to do between the meaning of education and road structure. An appropriation cannot create or develop mind or facilitate instruction, but can be of profit in comfort, happiness, cash. Thus when appropriations have been advocated for schools, the main cold argument therefor has been the value, the worth, the dollar-and-cent consideration, if you please, of education to the state and nation in the matter of safe, harmonious, comfortable, protective citizenship, because it is this cold cash saving and profit that is the axis upon which legislation turns.

That good solid roads throughout the state would be of general advantage and profit to the people, and not only to the people, but to the business institutions of the state, does not admit of a doubt, and need not be very fully demonstrated here, for every measure that adds to the value of property increases the value of security to banks and investors, every measure that facilitates the movement of persons and articles increases the business of railroads, every means that makes inter-communication rapid not only helps all financially, but even beyond the consideration of money gain, really advances education and religion.

Did not the abbots of France away back in the twelfth century not only build such magnificent churches as that of St. Denis, but lay up clean smooth highways to the doors of the churches from far villages? Thus did they not link in one both altar and home by the single act of circumventing the obstructive sinfulness of bogs and their permission? Money appropriated by the state for a return of that which money is used to purchase may result undesignedly in bringing about more christianity and education. Indeed in canvassing the matter of profit in state appropriations for roads, it seems plain that the increased general prosperity resulting therefrom would extend so far in fact, as to increase the revenues of the state, and thus in time lighten the burden of taxation, so that in due season it would seem any increased taxation by reason of appropriations insuring rapid transit would be equalled and over-matched, not only by a profit to the taxpayer, but by a profit to the state based upon advanced individual and corporate prosperity.

Then if money is appropriated by the state for schools because education is of value to the state, good roads being of value to the

1. Earth road in average condition.
2. Gravel road in good condition.
3. Earth road in good condition.
4. McAdam road in fair condition.
5. McAdam road in best condition.
6. Sheet asphalt in best condition.
7. Iron rails.



COMPARATIVE DRAFT ON DIFFERENT ROADS.

State, would not an appropriation by the state for solid smooth highways be a like matter of profit to the entire people of the state, as are appropriations for education to the same people? If this be true; an appropriation is due the people of the state upon the precedent established by the gift to schools.

Land is condemned by authority of the state for roads as for school sites. But there is an inequality between the two. The state takes our lands for roads, but unjustly goes no farther. The state, on behalf of schools, grants a seizure of lands, but considerably goes farther than in the case of roads. First, by giving the schools the authority to borrow capital. Second, by instituting and paying for state and county supervision. Third, by assisting directly in the maintenance of schools by appropriations of money.

The people are satisfied with all school legislation, but road legislation seems to be inoperative, ineffectual, unsatisfactory.

Again, the state by its legislation authorizing the seizure of land has given license to such a multiplicity of roads as to be beyond the power of over-taxed landowners to maintain *in a safe condition*. It is all very proper that land be condemned for roads the same as for schools, and that roads be multiplied in behalf of the public, but when a fraction of the public is unable to maintain all roads in good and safe condition, and as required by law, in such condition during winter and summer, throughout all the year, and that again for an entire and ever-increasing travel and traffic, when a fraction of the people is unable to so maintain roads, then certainly we make true discovery that road legislation, unlike school legislation, is incomplete without the assistance and agency of the state, further than the mere grant of condemning land.

Should a shoal gather across the bed of the Delaware river checking travel between Boston or Baltimore and Philadelphia, the merchants of Philadelphia are relieved by the government from paying toward removing the shoal.

Our general government also appropriates, as encouragement to trade, \$200,000,000 in steamship subsidies.

Now trade is not confined to ships or rivers, or again the passage of armies is not limited to seas. Trade is not confined to railroads, and yet railroads, being factors in trade, the general government, as a principle of national economy, has lent lavishly of its credit and given as lavishly of its lands for the building of lines over the great deserts and mountain ranges of our country for the sake of trade.

The heaviest trade of Pennsylvania is the wagon or common road trade. If this be true, why should it not be as fully a matter of public policy for a state to encourage local trade between farm and county, town or township village, by a partial building and support of roads, as it is public policy for the general government to subsidize ships and railroads, to hold rivers clear and even to appropriate money in the name of creeks that are never touched, all for the sake of general trade.

And yet the real estate owner of Pennsylvania, notwithstanding his over-burden of taxation equaling ten to one, comparatively, with that of the personal property owner, or eight to one with that of corporation the real estate owner, with all this over-burthen amounting almost to carrying out of the single-tax theory, does not crave of the state any special bounty to his class in asking state aid in the structure and maintenance of roads. He asks for that which will add to the prosperity of all classes and facilitate all honorable industry and enterprise.

Not only this, but the granting of state aid for roads is asked upon the score of an adjustment of rights, and charges real, personal and corporate wealth on account of the common rights and privileges each may hold in the common roads. It is a fraud and not a principle that one class shall construct and maintain roads for an entire population of a state.

Many real estate owners may indeed oppose a state appropriation for roads, fearing that such legislation would interfere with any bill equalizing taxation. Then again certain land owners may urge that the better way to secure the means to build roads, would be in the plan of townships collecting equally from personal as well as real estate for that purpose without any intermeddling by the state.

This all seems reasonable in the way of objection to state aid, but when we come to look within and know of that streak of our common humanity which ever revolts against taxation, we find that no matter how road taxation may be subdivided between all classes of wealth, any extended taxation for roads would in too many instances be out-voted, defeated by a township citizenship, and that too representing all elements of wealth and trade paying taxes, and all simply because of a general repugnance to taxation and a failure to study the economy or profit of an investment in better roads.

You may remember at the last meeting of this board, Mr. Kratz, the valuable member from Montgomery county, cited the suit of a township against its supervisor for carrying out the law in building a good road. I would really be pleased to know that by reason of the excellent lesson Judge Yerkes embodied in his decision sustaining the supervisor that this good, strong, conscientious officer was reelected. And yet a plea of his constituents might have been just had it been to the effect that a fraction of citizens is really unable to build and maintain roads within the legal standard. As was stated by Judges Yerkes, the law of Pennsylvania already contemplates the best, most economic road. But here is a supervisor who is sued for being so original as to carry out the law. An increase of taxation being repulsive, such might have been the case had all property been taxed. Supervisors, however, do not desire to be sued for doing what may be right, nor for the same cause do they relish being defeated in a canvass for reelection. Thus in order that our ample road laws, already in existence, shall be made operative, effective, there needs be an agency and authority in every county, free from all township hindrance and obligations, and further, instead of penalty as may be suggested for the enforcement of the law to the still greater bewilderment of the supervisor, it is better that there should be inducement or award by the state for the fulfilment of the law. This too as an aid to the real estate owner who unjustly bears the entire burthen of road maintenance.

Thus it seems, however various and clashing our early public thought may now be, road legislation will follow close to the design of school legislation in older countries, until common roads will receive the special favor of all state and perhaps our national government. All history, all solid exhaustive thought, argument, investigation points this one way, and in this direction will public sentiment center and drift.

A FEW SUGGESTIONS TO THE LAWMAKERS OF THE STATE OF PENNSYLVANIA REGARDING PUBLIC ROADS OR HIGHWAYS.

By F. JAEKEL, *Member from Blair, Hollidaysburg, Pa. :*

[Read at Wellsboro Meeting.]

It seems presumptuous in me to attempt to make suggestions to the Legislature of Pennsylvania; they are directly from among the people, and ought to be thoroughly familiar with the subject; but facts which suggest thought, and seriously affect us all in pocket and comfort, prompt me to say something on this subject, although others may say it better.

Standing alongside of a loaded wagon, one wheel of which has sunk down clean to the axle into a mudhole, and another broke by the sudden jar caused by the plunge of half the wagon in that hole, all manner of thoughts and suggestions will at once crowd into the excited mind of the unfortunate river, whose wagon has thus become disabled—perhaps a long distance from home; surely this man is in a dilemma which he can only solve by going to work, unloading, and get another wagon or wheel—would not care into whose ears he could shout the suggestions, coming from his troubled mind, nor care where he find some relief and assistance, to again get on his road; he does not want to be compelled to spend a whole day with his team on a few miles, to take to market a few bags of grain or a small load of hay, to buy with the small proceeds a few necessities for his family.

From such a hole we are now unable to extricate ourselves, losing much valuable time; are breaking wagons, harness, abusing horses and other draft cattle, and besides all the material losses have constantly before us a prodigious amount of causes for profanity.

Our roads are therefore not only the cause of much material loss to the people—their bad condition also adds largely to the sins daily committed by mortals against their Creator. The state is the direct loser of all the material advantages gone to sticks by bad roads, but who will have to give an account for the sins committed?

Nobody will deny, that the roads in the State of Pennsylvania, even the so-called turnpike roads—are in a bad and deplorable condition.

They are in the same condition as the roads in England in the seventeenth century, and of which Macaulay in his History of England gives a graphic description, stating that one chief cause of the badness of the roads seems to have been the defective state of the law.

When this country, over two hundred years ago, commenced to be settled by civilized races, no roads were found existing. The original inhabitants, the North American Indians, not like their brethren in Mexico and Peru, had no roads; trails sufficed to lead them through the woods over mountains and valleys.

Whenever they took a notion to migrate from one place to another all their possessions were carried on the backs of their squaws.

The early settlers, few in number, scattered over a large territory, were unable to make roads, they used and made serviceable the trails of the Indians, widened them by frequent travel, and in course of time it became a path, over which the settler could go on his horse, taking his grain to the mill, or buy at the nearest trader the few commodities his family needed.

Wagons were few. Even as late as 1858 the inhabitants of two townships, of one of the most populous counties at the present date, could but boast of the possession of one wagon.

After the revolutionary war, or after the beginning of the present century—the country becoming more and more settled—wagon roads became a necessity. An attempt in roadmaking was made, and some very good roads were constructed, traces of which can be found in parts of Fulton and Bedford counties, on the old state road from Baltimore to Pittsburgh.

With the building of railroads however, the progress of roadmaking received a sudden and lasting check. The belief entered the public mind that wagon roads would not be needed any more, and that they had outgrown and served their purposes.

No new roads were constructed, nor the old ones repaired, and with the progress of railroads they were needed more than ever, to convey over them the country's produce, to markets and to the different railroad stations.

In every industry, art and science, Pennsylvania has made tremendous progress. The legislature was annually called upon to make and pass acts, protecting every imaginable industry—even the riders on bicycles claimed and obtained rights by statutes, but nothing whatever was done for the sake of public roads. In everything progress and improvements were noticeable, except in the building and repairing of public roads or the laws relating thereto there was and is now an absolute stand still.

Cities obtained rapid transit—railroads entered the very center of our large cities—horse railroads, cable roads, electric roads were constructed in quick succession—every town or city clamored for rapid transit. The farming interest also clamoring for better roads, was seldom represented and could not be heard in Harrisburg, and only very recently has public feeling been aroused and a universal cry for better roads was heard all over the state.

Now the people want better roads, roads fit to be travelled over, either for pleasure driving or for hauling heavy loads to markets or railroad stations—they also begin to see that the present condition of our public roads and the laws relating thereto are antiquated and an abomination and something must be done.

Equalization of taxes, good public roads, and the abolishing of all fences in Pennsylvania, are at this present time the most important objects for our lawmakers to look into, and endeavor to remedy existing wrongs and evils.

With the equalization of taxes and the abolishing of fences we have here nothing to do, but we want and must have good roads.

Now how shall this be done? there are a thousand and one opinions prevailing, but all who have ever thought of this subject, will join me in this, that under the present existing road laws of Pennsylvania it is utterly impossible that a reformation could be effected.

Under our present system, the farming communities bear all the burden of making and repairing public roads. Over four-fifths of all the taxpayers in this state, never pay one penny of road taxes. To illustrate this assertion I will briefly relate the following facts:

Two towns one containing 6,000 the other about 35,000 people are separated at a distance of a little over seven miles. A turnpike connects these two places, over which a vast amount of hauling and pleasure driving is done. The toll on this road, for one horse and buggy, both

ways, is about twenty cents. Seemingly a burden and annoyance to the traveler. A nearer road between these two places, a road with almost railroad grade, could be made. The citizens of these two towns petition the court of quarter sessions for an order to survey and lay out a new road. The road is needed, the construction of it found feasible, the court orders a view, and in course of time an order is granted for the opening and maintaining of this road. It leads through two townships, the people or taxpayers of which have a large number of other roads to make and keep in repair, this road they need not at all, but the court has made the order, it must be obeyed, or else the supervisors go to jail for contempt. Now the making of this road may cost from eight to ten thousand dollars who pays this money? The town people numbering about 41,000 and including merchants who do an annual business of hundreds of thousands of dollars, the banker, the capitalist, the house owner? no! They all use this road, but have nothing to do with paying any expenses. The farm owners of the two townships, numbering in the neighborhood of three hundred—making a precarious living by hard work, seldom if ever using this road—they have to pay every cent for its building, and ever hereafter spend yearly a large sum of money for its repairs.

To remedy this evil, and take some of the heavy burden of the road taxes off of these three hundred farm owners, and divide it equally among all the taxpayers, would lead to the first suggestion, and which is: that a road of this kind be built and maintained by the state.

It will be seen at a glance, that under the present system all roads in the State of Pennsylvania, whether of any importance or not, are treated alike—the law makes no exception and all are considered of alike importance.

This calamity leads to the suggestion that all the roads or public highways should be divided into three classes:

First. State or main roads leading directly from one place to another from one county into the other general public highways.

Second. County roads, or roads of less importance than the first class, so called by roads.

Third. Township roads, roads which have only a very local importance, of leading from one farm to another or from the farms into the county and state roads.

The state roads should all be macadamized or constructed in the most improved manner—the other two classes need less scientific and costly building and repairs, but all should be in a passable condition at any and all times of the year.

The management of the state roads should be entirely in the hands of a state officer—a road commissioner or superintendent, supported by a staff of able road engineers. In order to facilitate matters, the laborers could be paid monthly by the treasurer of the county in which the work is done, on vouchers prepared by the road engineer in charge of the work, certified to by the road commissioner or superintendent, countersigned by the commissioners of each respective county, and charged by the treasurer to the state.

The management of the county and township roads should be in the hands of a county roadmaster, elected for each county, under the supervision of the county commissioners and supported by one supervisor from each township, who as heretofore should be elected annually by the voters of each respective township. The county roadmaster should receive a fixed annual salary. The supervisors should be paid a stipu

lated sum for each day actually at work, either by the state if working on a state road, by the county if working on a county road or by the township if working on a township road.

As a matter of course the county pays for the laying out, building and maintaining of all county roads and the township should pay for the making and repairing of the township roads. This would lead to the suggestion, that the prevailing road tax system be abolished altogether. The millage of the state, county and in the townships the school tax should be proportionally increased. For in the townships the school directors should provide for and defray all expenses for the making and keeping in repair of all township roads. As matters stand now some poor and thinly settled townships have hundreds of miles of public road which the taxables of such township are unable financially to keep in proper condition and repair.

Almost one-fourth of these roads are entirely useless and impracticable. Some of them are seldom used except by one or two individuals, but they standing on the records of the court of quarter sessions as public roads or highways, they must be kept in repair, and the individual farmer who uses this road a few times during the year insists that he work out his road tax on this particular road—what the working out of taxes on these roads means, you all know—and know also that an amazing amount of time labor and taxes is annually squandered in this way.

Looking these matters squarely in the face, we come to the conclusions, that at present the State of Pennsylvania has far too many public roads of minor importance or even useless—and many miles of these roads should be vacated and dropped from the records as public roads or highways. This presents another suggestion, which is: That committee should be appointed, assisted by the surveyor general and the county surveyors to prepare complete maps of the state, county or township, showing every existing public road; that after such surveying and mapping is completed, said committee assisted by the surveyor general, the state road commissioner, the county roadmaster, the county surveyor, the commissioners of each respective county and also the township supervisor shall definitely determine into which of the three aforesaid classes each and every road should be put—and also which roads should be vacated and declared as abandoned. All the people interested should have a chance to be heard either by petition, remonstrance or evidence.

More detailed suggestions would almost be impossible, the proposition is to make only a few of them and these general.

The seeming increased expenses would be nothing as compared with the benefits all classes of people would derive if this State, from one end to the other had good public roads or highways, and taxation was equally imposed upon all classes for their construction and maintenance.

PRINCIPLES OF FORECASTING BY MEANS OF WEATHER CHARTS.

By MAJOR FRANK RIDGEWAY, *Meteorologist of the Board, Harrisburg Pa.*

The earliest stage of meteorology in every country has always been the collection of popular weather prognostics, referring to the appearance of the sky or the movements of animals; and everywhere these observations lead to a considerable success in forecasting weather. For the last one hundred and fifty years the indications of the barometer, as observed by each solitary observer, have been added, in all civilized countries, to the older weather lore, and with increased power of forecasting. But within the last twenty-five years a new method has been introduced of combining on a chart the observations made at the same instant at a large number of places, especially with regard to the relative height of the barometer. These maps are called synoptic charts and round them a totally new science has grown up, which has developed a vastly increased power of forecasting. The problem of forecasting weather by means of prognostics and the observer's own barometer will always be of value at sea and at rural places but will only be causally alluded to here.

The object is to place before the reader, in an elementary form a brief account of the modern method of forecasting weather by means of synoptic charts, and though the general principles laid down hold all over the world, it may also be remarked that the whole system of synoptic forecasting, as this may be called, depends entirely on the observed association of different sets of phenomena, as is totally independent of the theory of atmospheric circulation.

Synoptic charts are so called from a Greek word meaning "a general view" that is, over a tract of country, and those prepared at the United States Signal Office are constructed in the following manner. Every evening at 8 o'clock punctually, telegraphic report are sent from nearly two hundred signal stations in the United States to the Signal Office at Washington, D. C. giving the height of the barometer and thermometer, with the direction and force of the wind, together with the actual state of the weather. Practically the weather changes are so rapid that these reports must be sent by telegraph to be of any use.

A blank map is then taken, and the first thing done is to mark at each station the height of the barometer. Lines are then drawn through all those places where the pressure is equal. If two stations have exactly the pressure required, they are simply joined, but if neither has the pressure wanted, we draw a line between them so as to divide the distance proportionally. Lines thus drawn are called "isobaric lines" or shortly "isobars" from Greek words signifying "equal weight" because they pass through places where the barometric pressure is equal. They are by far the most important element in forecasting.

Lastly, the readings of the thermometer are marked and lines are drawn through those places where the temperature is equal, just as was done for pressure; these lines are called "isotherms" that is, lines of equal heat. They play at present, a very small part in forecasting. The chart is then complete.

After the isobars, the direction of the wind is marked by arrows which are always supposed to fly with the wind and have great influence to the different shapes the isobars assume.

First, as regards to the direction of the wind. In few cases is the wind exactly parallel the isobars, but is inclined at an angle of about thirty to forty degrees to them, while the relation relatively to the adjoining areas of high and low pressure is given by the following rule.

The general rule is :-

Stand with your back to the wind and the barometer will be lower on your left hand than on your right.

Thus the wind may be expected to be :

Easterly, when the pressure is higher in the north than in the south ; southerly, when pressure is higher in the east than in the west ; westerly, when pressure is higher in the south than in the north ; northerly, when pressure is higher in the west than in the east.

The relation between wind and pressure is traceable in several older writings, but the credit of having persistently urged it, until it has met with general acceptance for all winds, is due Professor Buys Ballot, of Utrecht, after whom it is generally called Buys Ballot's Law.

Next, as to the velocity of the wind This has been discovered to depend, at least in a great measure, on the amount of the difference of barometrical readings over a given distance.

It is obvious to every one that the steepness of a slope is measured by the proportion between its vertical height and its horizontal length, and engineers measure slopes in this way, and speak of the steepness of a slope, or of the gradient as one in sixty, one in one hundred, etc.

Thus we get the idea of a gradient, but barometric gradients are not referred to in the same units of scale in the vertical and horizontal directions as are those of engineers for railroads. The vertical scale is expressed in units of barometrical readings, and the horizontal scale in units of geographical measurement.

The use of the term "gradient" as applied to difference of atmospheric pressure, first suggested by Mr. T. Stevenson, C. E., of Edinburgh, has been adopted in this and other countries.

These gradients are expressed in decimal parts of an inch of mercury per fifteen nautical miles, or about seventeen common miles. This proportion was chosen for the sake of conformity with the French scales. A hundredth of an inch is nearly equal to a quarter of a millimeter, so that the definition given above is nearly exactly equivalent to stating that the gradients are given in millimeters per sixty nautical miles, or one degree of latitude.

From the gradient thus estimated conclusions as to the probable force and direction of the wind are drawn. It is found, for instance, that the force of the wind will not generally exceed twenty-eight to thirty miles per hour, a "fresh" or "strong" breeze, unless the gradients be as high as two one-hundredth of an inch ; and that practically no storm of serious extent is ever felt over the United States unless there be a barometric difference exceeding half an inch between two or more stations. This, however, does not preclude dangerous squalls or blasts.

Observations show that the relation of wind to gradient can only be approximately stated, and that it is not the same in all parts of the world ; for it has been clearly proved by investigations into the meteorology of the equatorial regions of the Atlantic, which have been carried on, not only that the total difference in the barometer readings over the trade wind zones is much less than would be observed here for winds of the same force as the trade wind, but also that there is a marked difference in this respect even between the two trade wind in the Atlantic.

The chief signal officer, of the United States has decided to distribute as widely as possible these weather charts in order that the intelligent part of every community may utilize them by making special and local weather predictions and thus supplement the official forecast, which being for large areas of country, must necessarily be brief and very general in their character. In order to supplement the knowledge of individuals who are unacquainted with the generally accepted meteorology methods, a few words of explanation are considered necessary.

Storms are divided into two classes, one in which a deficiency of pressure occurs, commonly known as a "low" and another which appears in the form of an area of excessive pressure, and which is briefly known as a "high."

The isobars shows that the atmospheric pressure over the earth along the line is equal to that which would be exercised by a layer of pure mercury of a thickness corresponding to the number of inches against the isobar.

Low areas travel across the United States by diverse paths (the average direction being a little north of east) with a velocity of about five hundred miles each twenty-four hours. The winds blow contrary to the movement of the hands of a watch, spirally inward towards the area of lowest pressure, and their strength and violence are proportioned to differences of pressure and temperature, which on these maps are indicated by the crowded condition of the isobars and isotherms. The low area is preceded by cloudy weather and rain, which sometimes extend many hundred miles in advance of the center. It is also preceded by temperature quite high for the season, except in very hot weather, when the temperature, although higher by night, is lower by day owing to cloudiness. As a rule easterly and southerly winds are found in front of low areas. When the low area passes a place the winds shift into northerly or westerly, rain soon ceases, and fair weather shortly after follows.

High areas generally follow low areas. About one-half of them move eastward from Minnesota to New England, effecting the northern half of the United States; the others move first southward in the trans-Mississippi country to Texas, then drift eastward with the general circulation of the air, thus effecting the whole country. These high areas frequently advance with sufficient force and persistency to cause winter storms of severity and violence. The circulation of winds is reverse to that in low areas, as the currents blow out spirally from the center, in the direction corresponding to the movement of the hands of a watch. With the advancing high areas the temperature falls and the weather usually clears, especially in summer, when the "highs" are rarely of sufficient force to cause storms. When a high area is moving off the Atlantic coast, with its center over New England or the St. Lawrence valley, it frequently occurs that the northeasterly winds of such area bring rain and cloudiness along the New England and Middle Atlantic coasts. In the winter time the advance of high areas is often marked by very severe falls of temperature, which occasionally amount to twenty-five or thirty degrees in twenty-four hours. Whenever the temperature falls more than fifteen degrees in twenty-four hours and sinks below forty-five degrees, as happen at times with high areas, it is called a cold wave. The paths of high areas are also easterly in general.

REPORTS ON FRUITS AND FRUIT CULTURE.

By CALVIN COOPER, *Chairman.*

The season of 1890 has been one notably unfavorable for the orchadist and fruit grower, in nearly all departments, except some of the small fruits. Usually there are some exceptional districts, but they are hard to find this season. From the eastern to the western, and from the northern to the southern parts of the state, comes the one complaint of "almost a total failure."

Apples unusually scarce and very imperfect, with here and there a few trees that would have a medium crop of pretty good fruit. As to the cause, those engaged in fruit culture differ very much as to what may have been the reason why so general a failure, while some assign the early budding of the trees in February and March, others attribute it to wet and cold rains during the blooming season. From my own experience and observation, I am firmly of the opinion, that the open, soft, mild winter kept the trees in a partial state of growth for about three months prior to the usual budding time, when a severe cold snap with the mercury down to about twenty-five degrees, so crippled the fruit buds that proper fertilization was impossible. Of pears, most of the buds were frozen before they opened, hence but little fruit was set. Plums and cherries bloomed beautifully in the eastern part of the state, but, notwithstanding the bloom held a longer time than usual, but little fruit set. Peaches, I have never known so general a failure. A friend writes me he had but one peach on fourteen acres of trees, and attributes the cause "to an open winter which brought forward the buds to be killed by late frosts," and that some of his trees were in bloom in February. The quince shared the same fate with apples and pears.

Grapes, although not so complete a failure, were very much affected (except in very favorable locations) with rust and mildew; perfect bunches were the exception rather than the rule, but few varieties escaping. I learn of a few instances of success by bagging.

Raspberries, blackberries, currants and gooseberries in the eastern end of State were an average crop. Strawberries not as large and fine as usual, and some districts report them very poor.

Some districts in the southeastern part of the commonwealth are engaged in planting nuts for profit, notable the improved chestnuts and pecan or shellbark, which naturally grow wild in some sections, both of which can be easily grown in nearly all parts of the state, and there is no doubt could be made to yield a good investment with but little outlay of capital.

The season has been one of more than the average of precipitation, which having been preceded by an unusual open winter, seems to have been unfavorable to the fruit grower.

REPORT OF COMMITTEE ON ENSILAGE AND FODDER CROPS.

By J. B. PHELPS, *Chairman.*

Your committee on ensilage and fodder crops begs leave to make the following brief report: There has been no marked change in feeding stock the past year, but the question is beginning to be agitated, "What constitutes a balanced ration for our stock?" The most advanced farmers are beginning to realize the importance of this matter as thousands of dollars are thrown away annually by not knowing the just proportion of the different kinds of crops to feed. Hence the question. In our opinion, the question should be more discussed and more light given to the public.

Hay seems to be in abundance over the state, while oats is not one-half crop, and some places is almost a failure. Corn is a fair average crop, which is one of the most important crops we can raise. The silo is fast supplanting the hay bays, as storage for feed and ensilage is gaining ground wherever it is being introduced, notwithstanding the strong opposition it has met from those that have had no practical experience with it, and have opposed it through theory and prejudice. The actual experience of those that have used ensilage (with but very few exceptions) have been satisfactory and that is worthy of consideration. Time and experience develop new features which leads to improvements in the preservation of this feed. For instance, instead of planting the corn thick and harvesting it early, the reverse is now generally practiced. Corn should not be planted thicker than the common field corn and well matured, cutting just out of the milk stage. One stalk of well developed corn that weighs nine pounds, is worth far more than three that weigh three pounds each. Corn has been the general crop for ensilage and in our opinion, the most practical in this state. Clover has been ensiled to a limited extent, but not met with so favorable results as corn, mostly on account of being deposited in smaller and shallower pits, not being kept enough about it to exclude the air. This could be obviated by weighting immediately after filling.

The great questions for farmers to reflect over and study for the immediate future, is the cheapest food to feed and the best balanced ration to feed to their stock.

REPORT OF COMMITTEE ON CEREAL CROPS.

By GEO. D. STITZEL, *Chairman.*

The year 1890 was not one very favorable to the farmer. Low prices and crops below the average, except corn, were causes of much discouragement. However, wheat has advanced in price and the amount realized from that crop will be much greater than it was first expected.

There was a wide difference in the yield of wheat. In some of the rich, fertile valleys the crop was fully up to the average, but in most districts it did not exceed eighteen bushels per acre. The yield per acre ranged from twelve to twenty bushels. The fields came through

the winter all right, and looked very promising in the spring, but exceedingly wet weather about the period of blooming destroyed its fertility. There was a rank growth of straw, but the heads did not fill properly, and the grain was shrunken and not up to the standard.

The cost of raising wheat being but little less than the selling price, has caused many farmers to curtail the number of acres usually devoted to this cereal, and the result has been a falling off in the state. Farmers find it more profitable to devote more of their land to dairying, and the increased number of creameries has resulted in a much larger area being set apart to grass. The expense of maintaining the fertility of the soil is another cause for the decreased acreage of wheat. The future outlook for the wheat crop in Pennsylvania is not very encouraging.

Among the most profitable varieties of wheat in this state may be mentioned the Foltz, Fulcaster and Franklin. All kinds of red wheat are in demand for milling purposes. The white varieties have been dropped almost entirely from the list. In past years the white varieties readily commanded ten cents per bushel more than the old red sorts. The introduction of the roller process of manufacturing flour, however, has wrought a change, red wheat being preferable for this process, on account of its greater hardness. The white wheat is too soft for the roller mills. A variety of wheat greatly in demand for the roller process, on account of its superior hardness, is the Longberry Red.

The partial failure of the wheat crop this year is almost unaccountable. Just before the bloom appeared the wheat fields looked very promising. This was the general verdict throughout the state, and an old-fashioned harvest was confidently predicted. A protracted period of wet weather followed, which was not confined to any particular locality, but was of general extent, and drowned out the blossom. This undoubtedly had much to do with the decreased yield when the crop was harvested and threshed.

As to the best fertilizer for wheat, the verdict of all producers is plenty of barnyard manure. This, however, cannot be obtained in sufficient quantities and a resort must be had to fertilizers. Raw, or button bone is a valuable article for the wheat field, as well as, in fact, for all the cereal crops. It is always in demand, and, therefore, commands a high price. The numerous commercial fertilizers follow barnyard manure and raw bone in relative importance. As to what particular brand is best, it is needless to specify. The commercial value of every fertilizer now sold in Pennsylvania can be ascertained by a reference to the tabulated analyses furnished by the State Board of Agriculture. The thorough promulgation of the work of the state chemist as to the values of the fertilizers now in the market has been of incalculable advantage to the wheat growers of Pennsylvania.

The corn crop of 1890 in this state was more profitable than the wheat crop. Corn, in fact, is proving the most remunerative cereal that can be raised in Pennsylvania. In proportion to its productiveness it commands a better price per bushel than wheat. At this writing, corn brings sixty-four cents per bushel in Philadelphia, being but eleven cents less than the price paid for wheat a short time ago. The latter in view of a general shortness of the crop, and a demand for exportation, has advanced to one dollar and four cents. The average yield of corn this year is an increase on the average of the past few years. The crop also exhibited variations that are difficult to account

for. Some had to be replanted late in the spring on account of the wet weather and operations of the cut worm. The acreage of corn has increased, for the same reason that wheat has fallen off. The increased number of cows kept on the farms has created a demand for milk producing feed, and corn fodder being one of the best in that category, the corn crop is grown as much for its yield of valuable fodder as for its golden grain.

The oats crop was very light. The reports from all sections of the state agree in regard to this crop. In many localities it was a complete failure. Some fields were not worth harvesting, and that which was gathered was exceedingly poor. In a few words it may be said that the quantity was much below the average and the quality was decidedly inferior. The oats crop is an important one, and as a rule quite profitable, but the experiences of the past year were generally unfavorable.

Rye and barley are not grown to any extent in Pennsylvania. A few acres of the former are seeded each year by the farmers of eastern Pennsylvania as much for its long straw as for any other purpose. Where distillers are to be found it is also grown to be converted into whisky. Barley is cultivated to some extent in northwestern Pennsylvania where the cool summers are favorable to its growth. Buckwheat is an important crop in the northern tier of counties. The yield this year was rather below the average, but the quality was excellent. There is a steady demand for all of this cereal that can be raised.

The low prices which have prevailed in Pennsylvania for several years have been discouraging to the farmer, and less attention accordingly is being paid to the cereal crops. We find, consequently, a greater diversity of crops than formerly. Potato culture, fruit growing, and the raising of vegetables for the markets and canneries have their advocates especially in the southeastern section of the state, where the prices are generally fair. The importance of wheat, corn and oats, however, should not be lost sight of. With a prospect of prices improving, greater attention will no doubt be paid to these crops.

HAS THE TIME ARRIVED WHEN PENNSYLVANIA FARMERS SHOULD SOIL THEIR STOCK?"

By G. D. STITZEL, *Member from Berks County, Reading Pa.*

The condition of farming in Pennsylvania, low prices obtained for farm products, and depreciation of values in general, all points to the necessity of making radical changes in the character of our agriculture. For years the farmers of this state directed their attention chiefly to wheat growing. The prevailing prices obtained for wheat during the past ten years has, however, caused them to turn in other directions to make both ends meet—some to dairying, others to feeding cattle, others to fruit growing, and still others to diversified farming, paying more attention to special crops than to the raising of cereals. This condition of things has led me to ask the question: "Has not the time arrived when Pennsylvania farmers should soil their stock?"

In the first place, it is evident that to hold their own, farmers must obtain as large returns as possible for every acre.

The old practice of permitting cattle to run at large in the fields results in too much waste. A ten-acre field will scarcely furnish sufficient pasturage during the season for a herd of ten cows, whereas by the soiling process, four cows can be kept on one acre, or forty cows on the grass produced on a ten-acre field.

Thus, we already have a great gain. Next, we have an advantage in the fact that the expense of maintaining numerous fences is done away with. Soiling requires no inside fences, and if all farmers were to observe the same policy there would be no necessity for division fences between farms. The only fences required, therefore would be those along the public highways. Even those would not be needed if there were strict laws prohibiting cattle from running at large. The long lanes that must be laid out in order to reach the different fields on the farm can also be dispensed with.

On a farm of one hundred and twenty-five acres laid out in the form of a square, it is necessary to have seven fields to follow the usual rotation of crops now observed in this State. The dimensions of each field would, therefore, be seventeen and six-seventh acres, or say eighteen acres, necessitating the building of eleven thousand six hundred and seventy-five lineal feet, or eleven hundred and sixty-seven and one-half panels of ten feet each, of middle or division fences, at a cost of eighty cents a panel, amounting to the large sum of nine hundred and thirty-three dollars and sixty cents. To this must be added ten per centum annually for wear and tear, including the expense of keeping said fences in order. On a majority of the farms of the size mentioned will be found "worm" or stake and rider fences, which require a space of ten feet wide to set them, thus taking up about three acres of land, which would be capable of furnishing feed for from ten to twelve head of cattle during the summer season, under the soiling system. Under this system more than twice as much stock can be kept in better condition and will yield a still larger proportion of profit than by pasturing the land. Cows give better milk and more cream when kept in the stable during the hot season, as it is cooler there and they are not worried or pestered by flies.

As the manure pile is the pendulum of the farm, and every farmer is interested in increasing its size as much as possible in order to maintain the fertility of the soil, he will find by soiling his cattle that he has acquired a much larger quantity of manure, and that it is of far better quality than when stock is allowed to roam about at will. With an abundance of barn-yard manure the farmer saves the expense of investing in commercial fertilizers which is quite an item in his expense account.

It has been asserted that where cattle are not allowed to roam over the fields, the soil becomes too loose, but this can be remedied by going over the field with a heavy roller, which packs the soil evenly and much better than from cattle grazing in the field.

In these days of creameries, when in every farming community the milk is carted to the nearest establishment to be converted into butter and cheese, the land frequently becomes impoverished, through short cropping. This is avoided by not putting the cattle on the fields. The pasture also remains fresh all the time instead of being befouled by the cattle themselves.

Three-fourths of the dairymen of Pennsylvania are undoubtedly still clinging to the custom of pasturing their cows on extensive areas of partially suited land, whereas if they were to provide comfortable

quarters for their animals, and furnish them a variety of food, they would obtain more milk from each cow, and be able to keep a great many more head. Proper food is of the utmost importance in the dairy. It is a tonic that nourishes, strengthens and is the keystone to the lacteal support. It will not do to rely upon blood capacity alone, for all the good points of the thoroughbred will avail nothing without an abundant diet of milk-producing food to bring them out.

And right here a few points in regard to the silo will not be out of place. No pasturage need go to waste under the soiling process, as the surplus can be converted into ensilage. Green food can be obtained early in the year, considerably in advance of grass crop, by putting out two or three acres of rye in the fall. After having fed all the green rye desired if any is left the balance can be cut and put away in the silo, there to be kept until needed. The same can be done with the surplus grass.

Corn can be fed to better advantage by having silo. The corn should not be cut until the grains are fully formed, when the entire stalk can be cut up—corn, cobs and fodder—and all be fed to the cattle, thereby preventing waste. Good ensilage makes milk of the very best quality, and gives us the benefit of grass as it were in winter time. Some dry food should be fed with it to keep the cattle in good condition.

John Stewart, manager of the Morganza farm, in western Pennsylvania, who has had a silo in use for some years, says: "The man who builds and uses a silo will save some seven-eighths I would say one-half of the cost of wintering his stock, and will keep them in quite as good order, and get as much milk, beef or butter from them. The silo has come to stay. Formerly I thought it the rich man's luxury, but now I see that it is the poor man's necessity, and if I only had a farm of twenty acres I would have a silo and keep twenty cows the year through. Ten acres of ensilage will keep twenty cows in all they will eat."

In conclusion, I would call attention to the importance, in practicing soiling, of having good stock. A half-dozen good cows are worth a dozen poor ones. It takes as much food and care to keep a poor cow as it does a good one, and while the former barely returns enough, at most, "to pay her way," the latter returns a comfortable profit to her owner. Those farmers who are looking around for really good cows know how difficult it is to buy one, when found, at a price they can afford to pay. Yet they frequently keep "looking around" for several years when they might in the same time have raised several choice cows themselves. Of course, it takes time to rear a good-sized herd of profitable cows, but this expenditure of time is only in lieu of the money expenditure absolutely necessary to purchase a desirable animal. As a farmer usually can spare the time better than he can spare the cash, it is easy to see what is the best course to pursue. There are but few farmers who do not have at least one, two or three cows fairly good, which can be used as a start in improvement. Do not use a scrub bull merely because your neighbor happens to have him and charges nothing, but rather pay a fair price for a good pure-bred one. Save all the heifer calves and carefully raise them. When they are about three years old, and less than four years from the time the improvement is started, you will have fine young cows. Other calves will also be coming on, from them as well as from the original cows, and in five or six years there will be quite a herd, the common, unprofitable cows having been worked off the butcher. Many a farmer wishes he had com-

menced five or six years ago. He does not think that he will likely say the same thing five or six years hence, yet does not commence now.

Good pure-bred bulls have now become so well distributed that the use of one can be secured without much difficulty, while a good bull calf can be had from stock, eligible to entry, for a comparatively low price. Enough can, as a rule, be counted on from neighboring farmers' herds to pay for his keep.

AGRICULTURE—PAST, PRESENT AND FUTURE.

By W. S. ROLAND, M. D., *Member from York.*

Agriculture means the cultivation of the ground; in its more liberal and extended meaning it is defined to be the act of disposing of the soil in such a manner as to cause it to produce in the greatest abundance and perfection those vegetables which are useful and necessary for man and the animals depending upon him for subsistence.

The development, says Liebeg, "of the stem, leaves, blossoms and fruit of plants is dependent on certain conditions, the knowledge of which enables us to exercise some influence on their internal constituents as well as on their size. It is the duty of the natural philosopher to discover what these conditions are; for the fundamental principles of agriculture must be based on a knowledge of them. There is no profession which can be compared in importance with that of agriculture, for to it belongs the production of food for man and animals; on it depends the welfare and development of the whole human species, the riches of states, and all commerce. There is no other profession in which the application of correct principle is productive of more beneficial effects, or is of greater and more decided influence."

The culture or tillage of the ground is as old as is the creation of man. In all countries and amongst all nations, the first steps of the people from a state of barbarism towards civilization and organized society has been reached through the channel of agriculture; the masses of the people in all periods of the world, and at all times, from the highest to the lowest have been agriculturists.

"It is the most universal of all arts; the parent of manufactures and commerce, and the basis of all other industries, and without which all others must decay and perish."

It is the rock upon which is built the nations' wealth; it is the foundation upon which civilization and society rests; it is the surest road and safeguard to a nation's prosperity and liberty. In all climates where vegetation is not retarded or destroyed by excessive heat or cold, and where nature produces sufficient moisture and sunshine, and where the soil contains sufficient plant nutriment, crops in greater or less abundance will be produced, just in proportion to the amount of skill and labor that is employed. Other crops than only those which are indigenous to a particular locality of soil and climate, may also be introduced and cultivated successfully by the intelligent agriculturist, but to insure success the tiller must have knowledge of the nature of the soil, and of the adaptation of the plant which he desires to grow on that particular location. Then, with the requisite amount of skill, patience and energetic labor, good results may be expected. On this

question of labor, Daniel Webster said: "In a country like ours, above all others, this truth will hold good. If the people can obtain fair compensation for their labor they will have good houses good clothing, good food and the means of educating their families. Labor will be cheerful and the people happy. The great interest of this country is labor."

THE PAST.

In primitive times agriculture was not pursued and conducted with the same knowledge of the elements necessary in the soil as now, nor were the rude implements then in use so available and beneficial as is the knowledge of scientific farming and the farm machinery of more modern times.

Farming first began, when the Great Creator of all that is grand, beautiful and useful in nature planted the Garden of Eden, and placed man therein to enjoy the fruits of his labor; but He promptly "drove out the man," from that beautiful home farm, because of the man's disobedience in breaking a single commandment, which had been imposed upon him—he was cut off from the enjoyment of all that the Lord God had entrusted to his care. Subsequently, when that same Supreme Power had destroyed the whole population from off the face of the earth save his chosen few, "He blessed Noah and his sons, and said unto them: 'Be fruitful and multiply, and replenish the Earth.' " From thenceforth, as the earth was re-populated, agriculture became a necessary occupation for all those not employed in nomadic pursuits. Then, however, agriculture was in its infancy, and, as conducted by the hand of man, was simple and limited. As time went on the population increased, and the products of the soil were required or desired in greater perfection and quantity. The necessity challenged the ingenuity of those requiring the increase, and one improvement followed another from that time down to the present.

The earliest efforts in farming were simple and limited, and at times proved to be almost absolute failures in some sections of the country as was the case when the Children of Israel were compelled to go down into Egypt for corn, and other instances of want and suffering are found in the world's history. At that time the crudest kinds of implements were used for the purpose of breaking and cultivating the ground; branches of trees were used as plows to break the surface of the earth, and the seed was covered in an equally primitive way. Then when the season for reaping came around, the first implement we read and learn of was the sickle and afterwards the thrashing and winnowing, as well as the grinding, bolting and baking of the "staff of life," were all alike equally as crude in their construction. Nor was it in those extreme primitive times only that agricultural pursuits were so crudely conducted, as compared with a later period. For in more modern days, and even perhaps within the recollection of some of the older persons here, they may recall the times, when, as boys, they followed the plow that turned the furrow, in which they dropped the corn, with the frequent injunction sounding in their ears, "not more than three grains to the hill," and then in fancy they can yet see the men and women, boys and girls, armed with their broad-bladed hoes, following after and carefully selecting the freshest and loosest loam to cover the grains. Thus entrusted to the germinating power of the moist ground and warm sunshine, to be followed by frequent visits to the cornfield,

to watch the young shoots coming up, then cultivating them and waiting for the ears to mature; when cutting off, husking and cribbing followed in season. Nor can they fail to remember how the same and other fields had been plowed later on and put in proper condition for late summer and fall sowing—to have noticed the industrious farmer with his sowing bag swung over his shoulder, and toiling up on one side and down on the other of his broad acres, distributing the seed with his right hand and holding the bag in a convenient position on the other arm; the grain thus distributed over the plowed surface was immediately covered with the harrow or other like implement, and then trusted to the laws of nature for the result; and when the grain was ripe for the harvest, the now seemingly crude sickle was brought into use for cutting the grain, to be followed by gathering it for the barn or stack, and from hence, in due time, to be taken to the big barn floor, to have the grain threshed out by the continued beating of the tough hickory flail, or the monotonous tread of the horses, which were either led, drove or rode around that seemingly endless journey from early morning till late evening; it was a jolly bare-back ride of which the writer can testify from experience in that line of circus performance. In connection with this part of my subject, I am kindly permitted to draw the following home picture of olden times from the pen of my friend and fellow citizen, H. L. Fisher, Esq., of York: "The Germans were celebrated not only for their own strength, but for that of their horses, their farming implements and even their pleasure carriages—if they had any. Who that has lived his sixty years in Pennsylvania and has not seen the ponderous wagons loaded with many tons burden, and drawn by from four to six and sometimes eight enormous draft horses, such as are seen nowhere else? Who has not seen the old-time cider-press, with beam and screw, strong and heavy enough to move the earth? has not seen weavers' looms, spinning-wheels, reels and winders and saw clocks so heavily and strongly built as to convince one, not only of the abundance of material, but that the machinery itself was destined to enjoy a sort of immortality. So with their dwellings, but few of which, alas! now remain; not so much because they have yielded to the "tooth of time," as because of their antiquated style, they have been forced to surrender to the tyrant, fashion. One, however, not far off, and but slightly modernized, still stands its ground. It is pleasant indeed, to make it an occasional visit; to dwell upon its historic—its revolutionary memories, legends and associations—to look upon those rugged stone walls, thick and strong enough for a military fortress; to go into its celler, spanned with an arch strong enough to support a railway bridge; to see rugged iron hinges entirely across the massive doors; to climb the quaint old stairways, even to the garret, and see beams, girders and rafters that impress you more with a sense of your standing under a span of the Columbia bridge, than under the roof of a human habitation, and last, but hardly least, there on that garret, you may see, probably have seen, a dear old heirloom in the shape of a rocking cradle, that *should* go to the next world's fair; (emphasize as you chose, *next world's*, or *next world's*; and no doubt our mutual friend, General A. Hiestand Glatz, will see to it, even though it *should* be to the next world's). The head, foot and side boards mortised into stout posts are equal in thickness to tolerably medium stout planks: the bottom is, or once was, a net-work of heavy hempen rope and at the head there is, what remains of a delicate little framework of light scantling, designed, it is said, to hold aloof a veil

or other light covering over the head and face of the sleeping infant. The rockers are of a piece with the sides which latter are moreover, provided with suitable appliances in the way of more ropes to tie down the crazy quilt upon the little filibustering Pennsylvanisch Deutscher, and thus keep him from kicking off the cover and setting up for himself. No doubt the cradle like the house, was built by Johannes Schultz und Chirstiana, seiner frau, in or somewhere about the year A. D. 1734.

Where are the men and the women who were rocked in that cradle? Where is the mother who sang her sweet soft lullaby to her precious one, as alternately she gently tipped the rugged rockers or pressed the treadle of her spinning wheel? Gone back to dust long years ago; mother, child and grandchild; the cradle still survives, but rocks no more the little Teuton hero, as in the days of yore, "vanity of vanities, all is vanity."

THE PRESENT.

There is a marked difference between farming then and now, both in manner and convenience, and although the subject is an occasional reminder of other days that are past and gone; yet it is sometimes a pleasure to carry ones thoughts back in that direction. Now, while the soil is prepared by the plow, as of old, the grain-drill carries, sows and covers the seed, and while the same benign influences causes it to grow and ripen, reapers and binders cut, rake and bind it, and our modern splendid improved machinery thrashes, cleans, grinds and packs it without half the personal mental and physical wear and tear as was the experience years ago. We live in an age of vast enterprises and improvements and blessed with a large display of intelligent ideas, joined with a knowledge of the requisite amount of skill and art; nothing useful seems impracticable for modern man's achievement. If this is sound logic for the present, what will the future be? Look into the agricultural history of our country, and it will be noticed that a little over "one hundred years ago this land was comparatively a barren waste, the habitation of savages and wild beasts; while now it is a beautiful garden; the field of the farmer, the home of the scientist, the city of the merchant, the office of the student and the shop of the mechanic, where all work together in the prosecution of a common purpose to promote wealth, the health and the happiness of each other, and the honor of our much-loved country." With the knowledge of the past agricultural history of the world, of which most of us possess at least a limited amount, and with the information gained from study, experience and observation, and with our improvements, experiments and advantages already gained. The life of the farmer will be regarded as the most independent of all occupations, and better still, the most educated profession known to man. But in order to be a successful farmer, he who aspires to that honorable distinction, should not only know just what elements are required in the soil he cultivates, to render it productive, but he should be master of sufficient scientific knowledge to enable him to analyze the soil of the different portions of his farm, and when he discovers the absence of either of the elements required for the support of the crops he desires to raise, he should be competent to know just how to supply that want. How best can he do this? is the important problem for him to solve, and is one of easy solution, if he is master of the proper amount of agricultural knowledge and personal patience. "But" says one, "I know but little about the science

of farming;" if that be so, then it may be his own fault and he has no one to blame but himself for not giving that attention due from him to the occupation of his choice. If his crops are as great a failure as he shows himself to be, he should at once begin the work of improvement on himself, to be followed with a like improvement of the productive quality of the soil of his farm. Let him become a close observer and industrious reader, and educate himself in the line of a good farmer. Let him subscribe for one or more instructive agricultural journals, not neglecting his county paper. Let him meet his friends and neighbors at agricultural meetings, farmers' clubs and farmers' institutes, and take part in the business. Let him attend his county agricultural fairs and thus get information; and then with the knowledge from reading, observation and personal association, the life of the farmer is shorn of a large amount of labor, anxiety and many of the disappointments that beset the pathway of the uneducated and non-observant agriculturist, who plods along on his weary pilgrimage without the mental and physical buoyancy that usually accompanies the man who knows just what he is doing and just what he expects.

But the farmer, to be successful, should be ambitious and strive to keep up with the advance of the times. Let him become interested in the laying out, cultivation and improvement of his lands; in the opening, extending and improving of the public highways, in the manufacture of agricultural machinery and their uses, and in the education of the people. Let him avoid all foolish speculations, in the expectation of making a quick return of profits. Let him remember that honesty, industry and economy are safer avenues to wealth and respectability than wild extravagant ventures. Attention to these duties will amply repay him and will never cause regret.

The late Judge Watts, of Carlisle, Pa., in his centennial address of 1876, said: "What of the spirit of independence if our surroundings were the threatenings of poverty? What of the fundamental law of the land, if for our lives and property, we had not constantly in view the stimulants which the productive character of the earth affords? What of the speculative and roving business of the merchant upon the high seas of the world, if he had not the products of agriculture to deal with? What of the ingenuity and skill of the manufacturer, if his daily bodily wants were not supplied by the farmer? What of the value of freedom of thought and speech, if it were not for the marvelous proceeds of the earth and the science and skill by which they are produced.

THE FUTURE.

Then with our knowledge and experience of the past and the present of agriculture, what may be expected of the future? Certainly not that by any retrograde turn of the cycle of time, can we turn back to the primitive modes of the past. Nor that we should even call a halt on future improvements. But the motto should ever be onward and onward, and thus keep up with the improvements as they advance from year to year. So, in like manner, as the population increases, better and larger crops must be raised. Furthermore, we find our attention called to the future, with a view to still more beneficial results; for as the necessities of the rapidly-increasing population draws more heavily on the present supply from time to time, all consumers, as well as producers, are equally interested in the future production, and hence, the farmer is called upon to increase his efforts in that direction, and while

he may have seemingly been content with a crop of from fifteen to twenty bushels of wheat per acre, his ambition, pride and great desire is to double that and strive for more, and so in like manner with all his other crops, he will want to largely increase their production. If the farmer will give heed to the duty before him and strive to keep up with the times, the result must eventually bring large crops to his garner and wealth to himself. Then when his work is done and age creeps on him, he can be happy and rejoice that he has been faithful to his trust. With these few and simple suggestions carried out, and with the requisite amount of good judgment and vigor, and with the promise that, "While the earth remaineth, seed-time and harvest, and cold and heat, and summer and winter, and day and night, shall not cease."

WHAT SHALL WE DO WITH OUR LAND?

By EASTBURN REEDER, *Member from Bucks, New Hope, Pa.*

A few years ago, when the prices of farm produce began to decline, the farmers were told that they must *produce more* in order to make their business remunerative. Acting upon this advice, new varieties of grain were introduced giving greater yields per acre; the land was stimulated with fertilizers, both natural and artificial; improved herds of cattle were bought, and the product of the dairy was largely increased; agricultural implements of all kinds were adopted to save labor and lessen the cost of production.

Prices of farm produce still continued to decline lower and lower until the farming portion of the community began to cry out, as with one voice, "What shall we do?" Then it was discovered that there was a great *over-production* and this assigned as the cause of all the trouble. Is this true? Is the agricultural element, producing more than the world needs? Let us examine the question and see. Let us begin with our own state, and ascertain whether Pennsylvania agriculture is producing more of the necessities of life than her population needs. An examination of the statistics of the imports and exports of these United States reveals the fact that there are many things raised by our farmers of which we do not produce enough, and of which we are yearly importing large quantities. It is also somewhat a strange fact that there are many farm products of which we both export and import large quantities, and it is the excess of the one over the other that must decide whether we are producing enough of the article. Let us, in the first place, set up a few landmarks to go by before we begin to make comparisons or to draw conclusions.

According to the census of 1880 the population of our state was 4,282,891. To sustain this population we have 213,542 farms, containing 13,432,007 acres of improved land, and the total value of all farm products raised upon these acres is \$129,760,476, being an average of less than ten dollars per acre, and about six hundred dollars for each farm. The average income for each acre of improved land is ninety-six dollars and the income of the average farm is \$600. This was the status of agriculture in Pennsylvania in 1880. Does it look like over production? To me it does not. The average farmer cannot live upon an income of \$600, pay expenses and keep his family. What then shall he do? The

answer seems plain—to raise those products that yield more than ten dollars per acre. I will classify the farmers' products under four distinct heads, viz: 1, Live stock, and their products; 2, grain and hay raising; 3, fruit, and, 4, vegetables or truck. It is the combination of two or more, or all of these classes, that constitutes what is known as mixed farming. I will begin with the first class and endeavor to ascertain whether there is an over-production. In looking over the statistics of our exportations and importations the first thing that struck me was the amount we are paying annually for imported horses.

In the year 1889 we imported over 11,000 horses, free of duty, for which we paid \$2,955,409, or an average price of \$267. This looks as though there should be a good business here for several farmers in raising horses. In the same year there was also horses imported, upon which duty was paid, 43,417, amounting to \$2,052,346, or an average of less than \$50 each. Of this latter class it may be said they can be imported cheaper than they can be raised here. Let us next take cattle. In 1889 there was imported 4,250 head of cattle, amounting to \$12,870, being less than \$30 each, and these were free of duty, while in the dutiable list in the same year the number was 30,558, amounting to \$208,979, or an average of six dollars.

Let us now turn from this for a time, and see what the amount of our dairy products are, and what amounts our population requires and should consume. Our annual butter product is placed at 79,336,012 pounds. This is sufficient for allowing eighteen pounds of butter a year for every man woman and child in the state. In families which I serve with butter I find the average consumption of butter to be half a pound a week, or twenty-six in a year. To supply our population with butter at this rate would require 111,355,166 pounds and we are therefore short in our production of butter 32,019,154 pounds annually. I conclude therefore there is not an over-production of butter, and there is room for a few more dairymen, or for those already in the business to increase their product. We are also both exporting and importing butter and other dairy products. Our imports of butter for the year 1889 amounted to 72,927 pounds at a total cost of \$13,752. This is an average of nineteen cents a pound. The amount of butter exported the same year was 25,983,054 pounds amounting to \$3,961,532, at an average price per pound of fifteen cents. The amount of oleomargarine or imitation butter exported the same year was 2,119,209 pounds amounting to \$241,581 at an average price per pound of eleven cents.

In the butter trade the balance is in our favor, but the price of the imported article is four cents per pound more than the exported.

The amount of cheese imported last year was 8,796,717 pounds costing \$1,195,887, being an average of thirteen cents per pound; and the amount of condensed milk imported amounted to \$76,534. Our exports of cheese was 93,940,032 pounds amounting to \$8,482,407, an average of nine cents a pound for our cheese, while the quantity of milk exported amounted to \$261,228. In this investigation of our dairy business it appears that while we are not making as much butter as our own population should consume, we also have a large foreign demand, which should encourage our dairymen to produce a better and more abundant supply, and use every effort to suppress the fraudulent trade in the imitation article.

Eggs.—The next article to which I desire to call attention for a few moments is eggs. The census of 1880 made no enumeration of the poultry business, but it is to be hoped that the census of 1890 will give

us the statistics of this important industry. I find by the statistics of our imports and exports, that in the year 1889, we imported 14,585,550 dozen of eggs, costing \$2,071,614. This is an average price of fourteen and one-half cents. These were admitted free of duty. Our exports of eggs last year was 566,815 dozens, amounting to \$76,815, an average price per dozen of thirteen and one-half cents. Here the balance of trade is very greatly against us, and shows clearly that there is room for a few more to engage in the business of egg production at a fair price.

Hay.—The next item to which I will call attention is hay, the most valuable of our crops. According to the census of 1880, the hay crop of our state was 2,811,654 tons. This at ten dollars per ton would be worth over twenty-eight million dollars. I will not undertake in this paper to determine the question whether we are producing as much or more hay than we need, as that would be a problem of difficult solution. I find however that hay is imported by us in large quantities.

Last year we imported 116,809 tons, costing \$1,183,184 which is over ten dollars per ton. Hay is a dutiable article. Our exports of hay the same year were quite meager, amounting to 29,412 tons worth \$508,676 or seventeen dollars per ton. It would appear from these statistics that there is room for more to engage in the business of hay production.

Wheat.—The wheat crop of Pennsylvania, according to the last census, was 19,462,405 bushels. This is only four and one-half bushels of wheat for each inhabitant of the state, and is not sufficient to furnish our people with bread. I have found by many years' experience that it takes seventy-two bushels of wheat to furnish bread for a family of ten persons. This is an average of seven and two-tenths bushels for each person. The entire wheat crop of the United States was 459,483,137 bushels, equal to nine bushels for each inhabitant. If it requires seven bushels for each person we would still have little over one hundred million bushels of wheat for export.

Wheat is a dutiable article, the duty upon which I believe is now twenty cents per bushel. Last year we imported 109,181 bushels of wheat, costing \$79,601, or seventy-three cents per bushel. The same year we also exported 45,610,978 bushels of wheat, bringing \$48,506,671, or an average of eighty-five cents per bushel. This leaves a surplus of wheat in the country still of over sixty millions of bushels. Here is evidence of over-production. The lesson we should learn from these statistics is that it is no longer profitable to raise wheat to sell. We must make some other use of it. Turn it into butter, eggs, horses, or something that will pay better.

Potatoes. The next farm product to which I will call attention is potatoes. We are not raising enough potatoes as the statistics of our imports clearly show. The potato crop of our state, by the census of 1880, was 16,284,819 bushels. This is sufficient for four bushels for each person in the state, without allowing any for planting. I have not made the same observations as to the quantity of potatoes consumed yearly by each person, that I have with wheat, but my judgment is the amount is not sufficient. It will be observed that the potato crop is three million bushels less than our wheat crop, and if seven bushels of wheat are required annually for each person, it will be evident I think that four bushels of potatoes will not be enough for our own home consumption. The statistics of the imports of potatoes for the years 1888 and 1889 are as follows: Potatoes are a dutiable article. In the year

1888, for the twelve months ending December 31, 1888, we imported 6,491,057 bushels, costing \$3,051,067, being an average price of forty-seven cents per bushel. In 1889 we imported 1,506,846 bushels costing \$504,369, or an average price of thirty-three cents per bushel. When we consider that the duty on potatoes is fifteen cents a bushel there ought to be a profit in growing potatoes at fifty cents a bushel, if the yield is one hundred bushels per acre or over. From this it will also be seen that more land can be advantageously planted in potatoes.

Fruits.—Our imports of fruits, which are free of duty, are principally confined to bananas and cocoanuts, the former amounting to over three million dollars in both the years of 1888 and 1889. The principal importations of fruits upon which duties are paid, are figs, lemons, oranges, prunes and raisins. The importation of oranges amount to over three million dollars annually; while the importation of raisins and prunes is between one and two millions. As none of these fruits can be grown in Pennsylvania, it is scarcely worth while to consider them. It is a matter of regret that our census reports are not more specific in regard to our orchard products. The total value of our orchard products is only stated, and that amount is so small, that I believe it is only guessed at and gives no safe criterion to judge by. I know that some years we export large quantities of apples to England, for I stood last fall a year ago upon the wharves in New York city and saw hundreds of barrels of apples being loaded upon the steamer Eutruria. The readiness with which good fresh fruit always sells, leads me to the belief that we have not yet reached the limit of profitable fruit production. The yield per acre in dollars and cents, when devoted to fruit growing, is much greater than grain raising. I have now briefly outlined a few crops to which I think we can still devote our land with profit. The more important of these are horses, cattle and dairy products; eggs and poultry; with some of the vegetables and fruits. Wheat, corn and oats we can no longer raise profitably for sale at present prices. These should all be fed upon the farm and converted into more perishable products, where the competition cannot be so great, and where the profits will be more sure. Hay, on account of its bulky nature, can still be raised profitably for sale.

I have already stated that the average production of the improved farm land in the state, is less than ten dollars per acre. This would make the product of a hundred acre farm less than one thousand dollars, and the farmer cannot live upon that sum as other people live, and as farmers ought to live, and pay expenses. If the product were doubled, and the land made to produce twenty dollars per acre, or two thousand dollars as the annual product of a one hundred acre farm, it would not be more than sufficient to support the farmer and his family comfortably. Can this be done? I answer that it can. There are many crops will yield over twenty dollars per acre. But it can be done by a mixed system of farming.

FARMERS' INSTITUTES.

By CALVIN COOPER, *Member from Lancaster, Bird-in-Hand, Pa.*

Do we not have trade unions, boards of trade, labor unions, knights of labor, teachers' institutes, brotherhoods of engineers, and a multitude of other organizations, bound together for mutual protection, for the betterment of their respective members? While they are organized to a greater or less extent for selfish purposes, our institutes are free and open to every one, and the work intended to educate the masses interested in the production of all farm and garden crops, in the best manner and of the most superior quality.

I have inferred that the work of those engaged in agricultural pursuits is of interest to every man, woman and child upon the face of the earth, because all are consumers of the earth's products, which contain the elements that build up and nourish the human body, but that of the whole animal kingdom, living upon the earth's surface. Hence, I re-assert that all humanity are and should be interested in the success and production of the very life germs of our existence, and should place no obstacle in the way to baffle the most bountiful success of the husbandman. But all should lend an attentive ear and assist the fertile mind to devise the best modes of production, as well as the most improved varieties of all farm, orchard and garden crops.

If I am not mistaken, I have the pleasure of claiming that the first farmers' institute held in this state was in the county of Lancaster, which I have the honor to represent in this Board. If memory serves me rightly, it was during the summer of 1883, under a resolution passed in the Lancaster County Agricultural and Horticultural Society, before there was any action taken by the legislature in the matter. I well remember the meager attendance at that time, and must admit the committee of arrangements, of which Dr. J. P. Wickersham, formerly State Superintendent of Public Instruction was one, were very much discouraged. The audience could have been counted by a very few dozens, and although we had the Governor to give us a talk, the people of the country districts, were so self-satisfied with their condition, that no inducement could prevail to bring them out.

We have, however, much encouragement and consolation that the seed sown at that time has grown and produced good fruit. As the institute held in the southern part of the pioneer county of Lancaster, during the early part of last month, September 4 and 5, at Black Barren Springs, was attended by about five thousand people, and by a careful count of the vehicles as they left the grove after the close of the institute, there were near twelve hundred of all descriptions, besides many horseman and on foot. The interest manifested, and the attention to the exercises was of the very best; great crowds of ladies and gentlemen gathered around the speakers' stand during the exercises, and many joined in the discussion of the various topics under consideration. Never have I seen so much interest manifested, nor heard the many expressions of commendation from the best element of society, upon the good work of the State Board of Agriculture, and the institutes held under it. Hence, it is safe to conclude, that the inspiration of the thought that brought about the first institute has spread its beneficial effects all over the commonwealth. And from the little seed sown in Lancaster county during the summer of 1883, grew into a well-devel-

oped plant in 1885, when it was grafted by the members of the legislature and sealed by the Governor, which has now grown into a large tree, spreading its branches over the whole state, that the fruit thereof may be freely enjoyed by the whole people thereof, owned and controlled by the great Commonwealth of Pennsylvania.

The first action taken by the legislature to encourage and assist the farmers' institutes, was on June 23, 1885, when an appropriation of one thousand dollars a year for two years was made, and the fund placed under the control of the State Board of Agriculture, under which some nine or ten institutes were held in different parts of the state. The work having proved satisfactory to the lawmaking power, the session of 1887 increased the appropriation to three thousand dollars a year for two years, and some twenty odd institutes held each year, with an increasing interest manifested in them. The legislative session of 1889, appreciating the importance of the work, made the appropriation five thousand dollars a year for two years, which ends on the first day of June, A. D. 1891. The institutes held during the last year were fifty-five in number, more than doubled during the last two years; indeed so great was the request last winter, that the committee in charge were apprehensive the fund appropriated would be insufficient to defray the expenses of so large a number, which would undoubtedly have been the case but for the guardianship of our secretary over the fund applied for this purpose, and notified all, that the limited amount to each must be strictly observed or encounter the risk of not having all bills paid.

The committee to whom this institute work has devolved, have made an effort to district the state, hoping thus to be able, by reducing traveling expenses, to accommodate the increased demand for institutes. It is hoped these subdivisions of the state of two or three neighboring counties, easily accessible to each other, will arrange to hold their institutes during the same week, so that lecturers and essayists, invited to attend from a distance, may go from one to the other at a much less expense, than from districts remote from each other. It is absolutely necessary that some such measure *must* be adopted, to meet the demand of all the counties asking for them.

It must not be forgotten that the comparatively thinly settled counties of Potter, Greene, Fulton, Pike and others, have the same claim proportionately as other counties that are more thickly populated, and hence, it becomes necessary for the Board to devise such methods as will accommodate the whole people of the commonwealth interested in this work.

It will be necessary during the coming winter to devise the most economical plan to comply with the increasing demand, quite a number of new counties having applied that have not heretofore held institutes, in addition to those of former years. It is therefore probable we will either be required to have less expensive meetings, or adopt some plan that will reduce expenses, and it is hoped that the districting the state, as heretofore referred to, will accomplish the desired end.

It has been suggested that these farmers' institutes be placed under the care and management of an institute manager or commissioner, such I am informed is the case in New York State, where they appropriate ten thousand dollars a year for the purpose, and appoint commissioners at a salary of ten dollars per day and expenses, who controls the institutes. I doubt not we in this commonwealth could readily find some ambitious politician who would gladly accept such an appointment for the public good and his special benefit. But under the

liberal allowance by our neighbors across the line, from the treasury of New York State, I fail to learn that they hold any more institutes than we with half the amount; nor are they of any more practical benefit to the agricultural community. I cannot, therefore, see the advisability of such change here, until we have a superabundance of funds and some one to place on the retired list as manager for the commonwealth.

I fail to perceive at present any better mode of conducting these farmers' institutes than where it now is, under the control of the State Board of Agriculture. The members of the Board, representing as they do all parts of the state, most certainly have a better idea of the wants of their respective counties than any set of two or three commissioners that could be appointed for their management.

By request of a friend interested in the working of the Board, I suggest the propriety and practicability of holding an annual competitive test of all new agricultural implements and machinery at some point easily accessible by rail from all parts of the state. This might be termed the annual test institute. The object being to have on the ground and at the time a practical and comparative test of all the new and important machinery used in agricultural pursuits in this state. Fields of grain and grass especially prepared with this object in view, where our people could attend, and compare, by actual observation, the utility of each machine in operation upon the field, and where every appliance would be available to test draught, strength, weight, tension and all other practical requirements that might be necessary to make up a perfect machine of the very best quality, so that such intelligent information could be obtained to a certainty, of the most desirable implements for use upon the farm.

It is believed by the advocates of this measure, that the manufacturers would gladly assist and contribute of their means towards the necessary expense, if the trials were held under some impartial management, as the State Board could devise. The want of such actual test, has subjected our yeomen to many impositions in the purchase of machinery of but little utility, and in many instances worthless articles not adapted to their wants and purposes. And I doubt not much good could be done, if the matter could be taken in hand by the Board, and hold annually one or more of these comparative and competitive agricultural machinery test institutes.

Farmers' institutes are only not educators in the business interests of the farm; but they awaken the social qualities as well, that too often lie dormant in the isolated and sparsely settled districts. This is one of the most valuable features of this institute work. The gathering together of neighbors and friends, and renewing the social element within us, exchanging ideas and observations, experiments and their results, in the most honorable, healthful and interesting vocation of mankind.

THE WASTES OF THE FARM.

By JOEL A. HERR, *Member from Clinton, Cedar Springs, Pa.*

The process of farming in this state is gradually changing. Instead of the old routine of crops, corn, oats barley, wheat and grass in regular succession, which constituted almost the sum total of all the products of the farm, other crops which were formerly considered as unimportant and unprofitable are being extensively cultivated. Farmers have been brought to realize that they cannot successfully compete with the great west in the production of the cereals. Cheap lands, cheap freights, and unjust discrimination has compelled him to so vary his products as to supply with the more perishable articles the markets of our eastern cities. In multiplying his products he multiplies the care and skill required to produce these products. He is confronted with new enemies of the varied crops he would raise, that he has to use his wits to an unprecedented extent to contrive ways and means to overcome them. His ingenuity is tasked to so vary his crops, that whatever may be the misfortunes of the seasons a total failure will be provided against.

The farmer who depends on raising a few acres of wheat to be sold at one dollar per bushel, or of corn to be sold at fifty cents per bushel, will prove a financial failure. His income must consist of a largely increased variety of crops and articles of sale, which, in the aggregate, will amount to more than the old succession of crops. These numerous cares require very close watching. To systemize his work so that all these labors shall be met without serious confliction is a task of no mean proportions. It requires about as much generalship to successfully manage a variety farm as it does to command an army. Each crop requires certain attention at a stated time. "There is a time for everything," and the great problem is how to attend to everything at the proper time. A little loss here, and a little loss there, multiplied by the large number of chances for loss which confront the farmer, if saved, would amount to a profit in the aggregate that would be a fair reward for his labor; but which if lost would deprive him of all the profits there are in farming. This subject of "Wastes on the Farm" is a most comprehensive one. It covers the whole operation of farming, extending into every department, from the management of affairs in the house with regard to economy, to all the operations of the farm. The former we will delegate to the women of the household to discuss, and we will only try to point out some sources of waste in the latter.

In "Wastes on the Farm" we shall not be confined to what escapes and is lost for want of proper attention, but also to the gain which might be made by doing things at the right time, in the right way and with a fixed purpose in view.

Economy is a great virtue in anyone, and especially in a farmer; but economy alone is not good farming. Economy is not only a virtue but a necessity to the successful farmer. Economy, however, must not be confused with parsimony or niggardliness, as these are not virtues. The farmer who produces but five hundred dollars worth of crops on a given farm, and saves and hoards, by pure niggardliness, the one-half that, is not nearly so good farmer, or so good a citizen as he who on the same farm would produce \$1,000 worth, and would save but one-fourth of it. By close attention the farmer who understands his business, should be able to live as well as his neighbor who works for a fair salary, and

in addition realize a reasonable interest on his investment. If he fails to do this, there is something wrong, and the sooner he finds some more profitable employment, the better it will be for him. He is wasting his talents. The systems of farming vary so with location, soil and climate, that while what we may have to say will apply to some extent to all farms, it is more especially designed to apply where the land is cultivated and mixed farming carried on. "Feed the farm and the farm will feed you," is a tried and true maxim. Hence necessity of keeping up the sources of fertilization on the farm. A prolific source of waste on a farm is the leaching of the manure by heavy rains while in the barn-yard, carrying away in a liquid form nearly all that is valuable as a fertilizer. When it is possible barn-yards should be covered, and only watered sufficiently to cause the manure to rot and prevent burning and the consequent escape of ammonia. This is also a saving by being a protection for stock against cold and wet. If not practicable to cover the barn-yard with sheds, they should be shaped so as to allow as little water to run in them as possible and be somewhat basin shaped to prevent the juices escaping. Or, better, have a reservoir built in which to store all the drain until needed. Manure from the stables should be taken directly to the fields and scattered whenever it is possible to do so.

The abuse and neglect of stock is another great source of waste. To obtain the best results from stock of all kinds they must be carefully and kindly treated. Any undue excitement or worryment, as a change of stall, severe handling, abuse by a dog or man, or unusual exposure to heat, cold or wet is a greivous waste that should be carefully avoided. A flock of sheep driven, excited and worried by dogs, is well nigh ruined for that year even if they are not bitten. Sheep need to be kept quiet free from excitement, and handled with care. A careful shepherd would no sooner think of grasping a sheep by the wool in handling it than he would of grasping a child by the hair in handling it.

The keeping of dogs on a farm or elsewhere is another great source of waste. There may be some profit in keeping a good shepherd-dog if the proper time be taken to train him; but it is safe to say that four out of five of all the dogs in the country are expensive nuisances. They should be taxed out of existence.

It is a wasteful practice to rear inferior stock when a little more outlay at the start and the same feed will rear improved stock that will command superior prices. To the young farmer I would say, start with good breeds of stock suitable to your business, if you are obliged to do with less of it. There is a greater interest on your investment to be made out of it. Proper feed put into stock sufficient to put them in good condition is considered a good investment. Keep no more horses on the farm than are necessary to perform the farm labor. Horses are an expensive luxury when not needed.

There are many wastes in the dairy worthy of notice. Neglect to care for cows at proper and regular intervals or to see that they are properly and cleanly milked are wrongs that are expensive. The importance of proper shelter and of regular feed and drink at fixed times should not be overlooked. To feed a double quantity at one mess and neglect to feed the next time is a waste of feed. Animals acquire habits of feeding; and to make an economical use of feed it must be given in even amounts at regular fixed times.

It is important that stock should be bred at the proper time to bring the best prices. It is a well-known fact that fresh milch cows command

a better price in the fall than in the spring, and yet we find three-fourths of them fresh in the spring. A good profit could be realized by breeding them so as to come in profit when prices are highest.

It is economy to feed calves extra well the first year of their growth, as it is during that period that they are apt to become stunted. A good thrifty calf one year old is largely raised, as it has passed the crisis of its chances for life and development.

Do not allow to pasture when the fields are wet, nor too early in the spring season. The injury to the fields is greater than the expense of feeding the stock at the barn.

It is important that stock should be regularly, but not excessively, salted. A barrel of salt can soon be wasted by giving too much at a time and by feeding in dirty troughs and filthy places on the ground.

Where forest leaves can easily be obtained it is desirable to use them for bedding stock and to make manure.

There is a great waste in the common method of feeding coarse feed to stock. The seeds and chaff of the hay fed to horses should be regularly and carefully gathered, and fed to calves or cows, who eat it greedily. If mixed with some bran or meal, and moistened it will be still better. The refuse hay which is often wasted under the feet of horses that are fed in racks should be fed to cattle. Corn fodder, if housed in good condition, should be cut and crushed for food for cows and colts, thus making it go nearly fifty per cent. further, and being in much better condition for the manure pile. Many farmers claim to have experienced very good results from feeding clean, bright straw at least once a day to horses, which is often a saving of feed. I will not trespass on your time to show you the benefits of the soiling system of feeding stock, enabling the farmer to keep much more stock on the same acreage, with less injury to the land from being tramped to death. Suffice it to say that it pays to feed more at the barn, and pasture less on lands which are used for cultivation.

We suffer a great waste by not properly caring for the poultry on the farm. By carefully sheltering, and regular and judicious feeding, the egg product is materially increased, affording a handsome profit to the raiser; and their droppings, which are frequently if not usually wasted, if preserved, and properly prepared, are a most valuable fertilizer for all crops, working well in drills, and used instead of the more costly commercial fertilizers of our markets, and with better results.

It usually pays to fatten pork early, when the weather is mild, and less feed is required to do the work. The price is also higher than later in the season. Cooked food at intervals fed to swine makes them fatten rapidly and saves feed. Whole food is much wasted, and what is eaten is often but poorly digested.

Tendencies to waste on the farm are legion. The land itself is apt to waste, and much that we put on it goes to waste.

The excess of water on many of our farms should be taken off by drains or held in reserve in reservoirs for use in dry seasons. Draining with the improved machinery for that purpose is not very expensive, and usually pays a large profit on the investment it costs.

Good roads are a great necessity on a farm. Good roads mean a saving of vehicles and farm implements and machinery, ability to haul greater loads, a saving of valuable time when time is worth "big money." Roads should be made during the slack season, and by a very little attention from time to time to keep the sewers open, and

loose stones out of the way, may be kept in repair without any serious interference with farm labor.

A common sign of a careless and shiftless farmer is fence rows grown up with sprouts, briars and noxious weeds. These nuisances, if taken at the proper season (during the months of July and August) are easily and permanently destroyed, but if left to be eradicated in the winter or spring are only cultivated instead of being destroyed. Another good sign of a careless farmer is poor fences. When fences are kept at all, they should be kept in good condition. The eye of the farmer should be constantly on his fences, and the first break should be promptly repaired. Good fences mean quiet, peaceable stock, and what is still more important it means good neighbors. It is very probable that there are more quarrels among neighbor farmers because of bad fences than from all other sources combined. Therefore, good fences mean a saving of time and trouble in care of stock, a saving of temper and a saving of friends.

Much valuable time and labor is wasted by not doing things at the right time. It pays to mow the weeds from grass or stubble fields in the fall before their seeds are ripe, and either destroy them or cast them together in piles to be converted into manure. Stones should be removed from the fields to be mowed, in the fall, when the fields are bare and they are easily seen and handled, and the work can be done much faster and cleaner and with less injury to the fields. Fruit trees and vines should be pruned in the mild winter weather or early spring before the throng of work comes on. It is a waste of time and money to attempt to grow fruits without giving the trees proper care and cultivation. They should be fertilized as well as for corn, and should receive as much labor and attention, and they would prove vastly more profitable. The borers should be removed from the apple, peach and quince trees twice a year. Neglect to do this often costs the life of the tree. The curculio must either be caught or poisoned on the plum trees or the crop will generally prove a failure.

The waste land of the farm in many instances might be profitably planted in chestnut, locust or walnut trees which would soon become valuable for fencing and timber.

It pays to sprout sorghum, broom-corn and similar seeds by scalding a few days before planting, so that an early growth may get ahead of the weeds.

It pays to pack such products as butter and eggs when the prices are very low, and hold them for higher prices. This, in the case of eggs, need not be long, perhaps only two or three months at most—and enables the producer to realize the profits of an advance in price, instead of the dealers. It would also have the effect to keep prices more uniform by preventing gluts in the markets. A great gain is made by an intelligent effort to produce these commodities at a time when the price is likely to be highest.

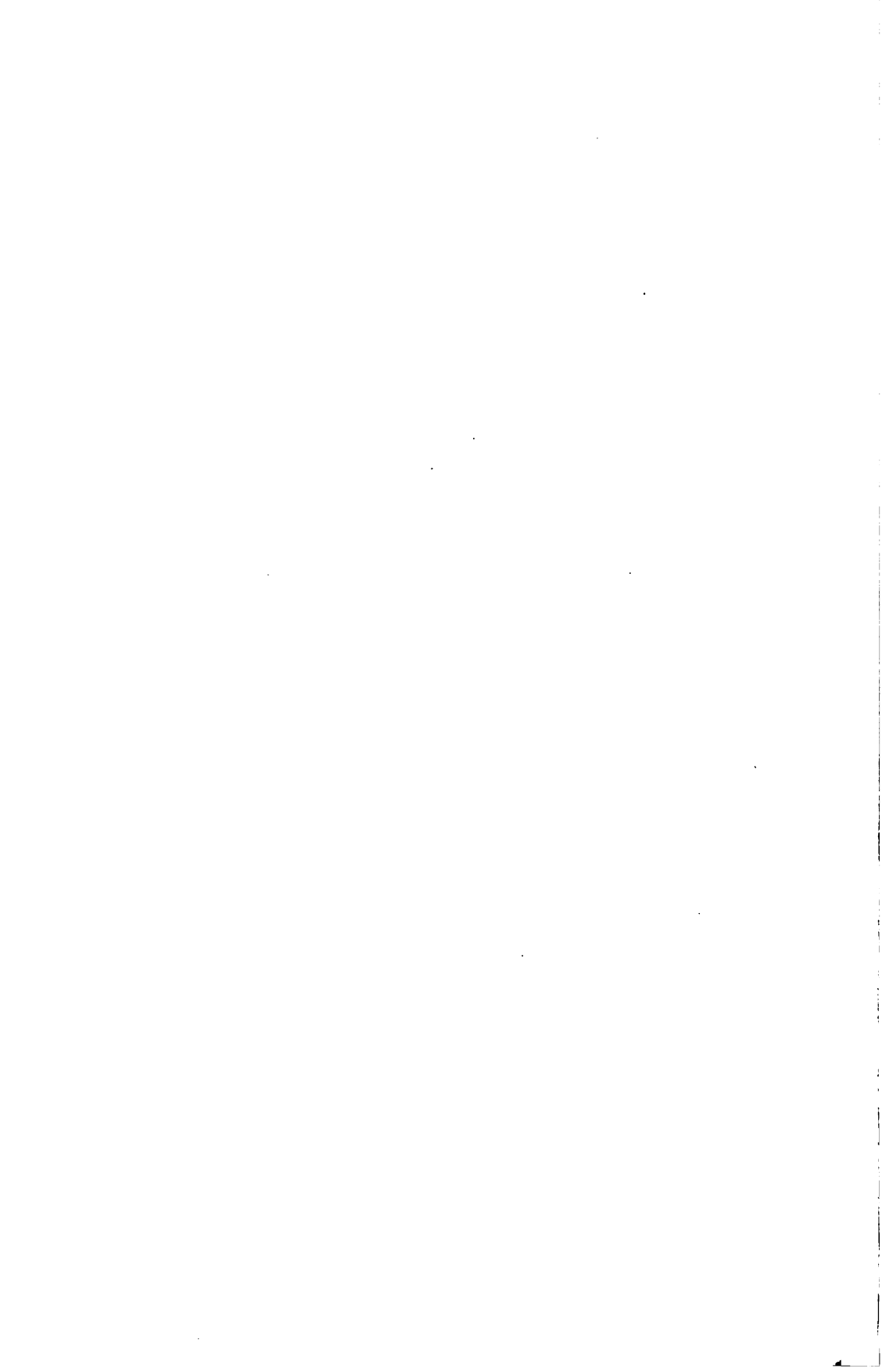
There are very many small matters of waste on the farm which are seemingly unimportant, but which, aggregated, become important. Among these we mention the allowing of early fruit to waste and decay, which might profitably be converted into vinegar, leaks in the vinegar barrel; failure to market perishable fruits at the proper time; allowing the blades stripped from sorghum to be wasted which makes the very best of feed, allowing winter apples to remain on the trees till over ripe; harboring English sparrows; allowing young trees to grow unshapely; negligence in providing good boxes or nests for the fowls; negligence

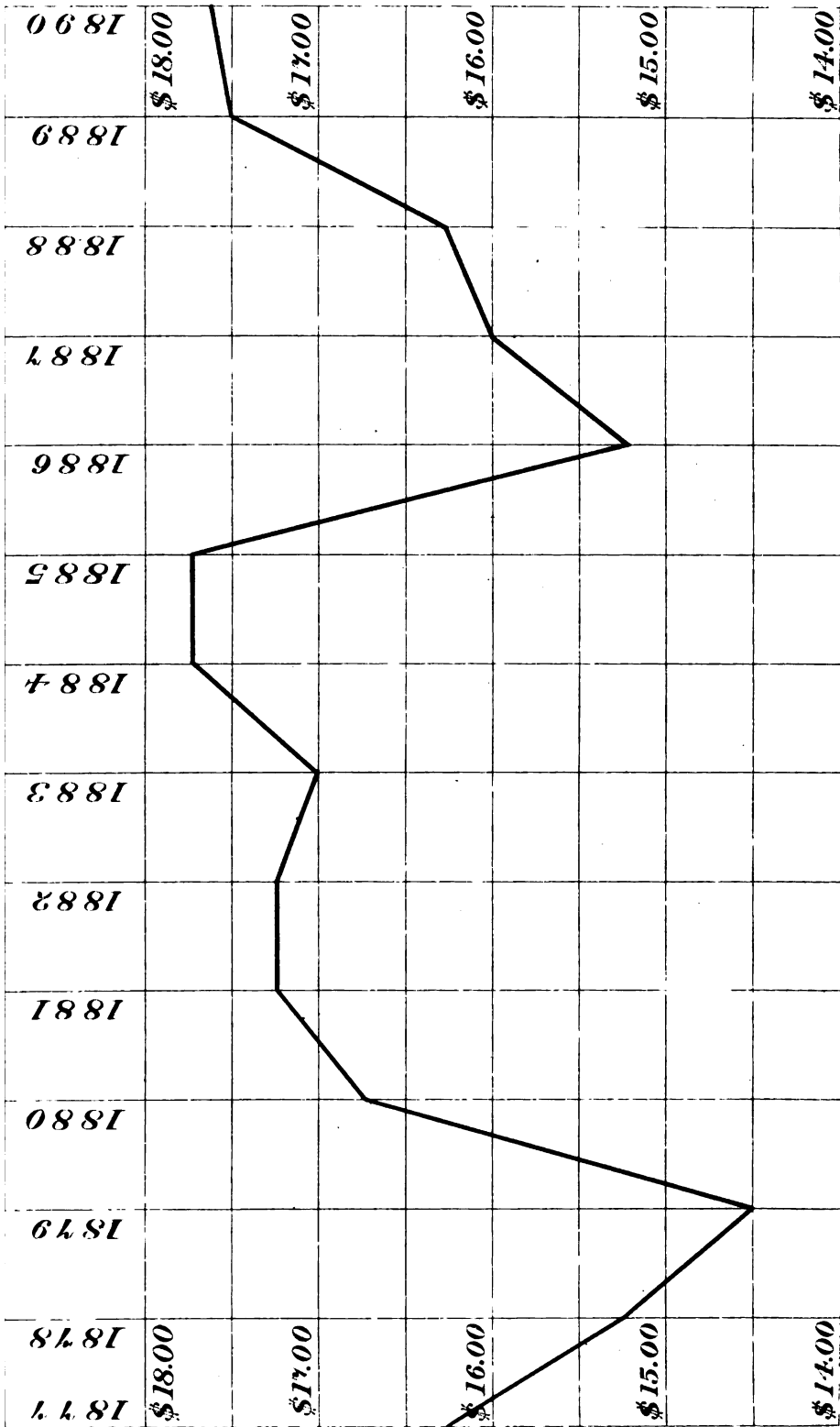
in destroying noxious weeds, such as Canada thistles, ox-eye daisy, wild carrots or buckthorn, when first discovered.

Every farmer should have a good shelter in which to keep his farm tools and implements. Besides saving them it will save much valuable time and a great deal of annoyance in knowing just where to find them when needed. "A place for everything and everything in its place," is what is needed. All articles of repair, such as bolts and burrs, screws, hinges, nails, etc., should be in receptacles especially prepared for them, within easy reach of where the implements are kept. During the busy season, time is of the greatest value. Every device by which a saving of time is effected should be used. The farmer who can think of but one thing at a time will fall behind. The vast multitude of seemingly small items that must occupy the attention of the farmer at the same time, the forethought required to plan and successfully carry out all the operations of the farm in all their minutia and detail, requires a level head and a well-balanced mind that will not get confused, but is able to direct each thing to be done at the proper time. The hotel waiter who could take but one order at a time would be in little demand, and the farmer who can think of but one thing at a time is just as useless. Presence of mind is an important requisite in a farmer.

The difficulty of procuring good farm hands is a serious matter to the farmer. Farm labor is classed as cheap labor, and it is most frequently necessarily cheap because it is unskilled and much of it really worthless. Almost any strong man imagines he would be a good farm hand, but it requires something more than mere strength and awkwardness to perform farm labor. Farm labor should be skilled labor. A crop is easily lost by not being seeded properly, or by not being carefully cured and housed. The minutest details of farming is often where the profit in the whole crop lies. This is especially true in the handling of tobacco, which is becoming one of our leading crops. Herein consists the value of a careful, considerate laborer, one who sees these wastes in their incipency and finds time to correct them without seriously interfering with other regular duties. A sewer opened, a loose stone thrown out of the way, a fence rail laid up, a stake fastened, a post straightened, a loose board nailed fast, a gate hinge fastened, a noxious weed pulled out, a sprout knocked off, a plant straightened, a strap sewed, a leak stopped, an axle greased, a burr tightened, and a hundred other little things which require but a moment to attend to as he passes along in his daily work, but if neglected for a time require special attention and often days of valuable time to correct, if they do not lead to accident and heavy loss. Truly it can be said of farm laborers, "a stitch in time saves nine." It is cheaper to pay a good farm hand twenty dollars per month than it is to pay to ordinary hands twelve or fifteen dollars per month. The opportunities for waste are so great that a careful hand saves the difference in wages.

It would not be within limit of our brief paper to treat of all the wastes on the farm. Suffice it that we have presented these few for your consideration and criticism, hoping that the discussion of them may lead to their remedies.





VARIATION IN FARM WAGES FOR FOURTEEN YEARS -1877 TO 1890
FOR SUMMER MONTHS WITH BOARD.

A PLEA FOR BETTER LIVE STOCK.

By M. W. OLIVER, *Conneautville, Pa.*

While we have been making great improvement in some branches of stock raising, in others it can scarcely be said that any perceptible improvement has been made within the past score of years. I am of the opinion that if a lot of cattle were not to be bought up, taking them as they would show but little improvement, in quality, over a similar lot of ten years ago. While we have greatly improved our stock of hogs and are making great improvements in sheep and horses, cattle are too much neglected by the majority of farmers.

While our lands are increasing in value, with increasing taxes and expenses, a great many are breeding and rearing cattle that are paying but little if any more than the interest and taxes on the land grazed by this stock.

Why is it that the half and three-quarters-bred cattle of the west and northwest are selling for nearly twice as much per pound as the common cattle from Texas and New Mexico? Nor need we exclude the common stock of our own state. It is not because of the superior quality of the former.

Texas and New Mexico have territory enough to furnish all the common cattle the eastern markets demand. When we consider the capabilities of the west and northwest, Montana with her thirty-eight millions of acres of grazing lands, Idaho, twelve millions, other states and territories in proportion, or when we count the vast numbers of cattle in some of these states and territories, Wyoming with quite three-fourths of a million, Texas with quite three and one-half million, Kansas more than a million, Missouri nearly one and a half million and Iowa almost two millions, cannot we readily see from this, at least, that the Pennsylvania farmer cannot afford to waste his time, capital, feed and other expenses, in raising common stock. There is economy in breeding as well as in feeding. Economy however is not always a mere saving process. "There is that scattereth and yet increaseth," truly said the ancient wise man.

Improved cattle are far more valuable to their owners, though costing more, whether they be used in the dairy or are consigned to the block, than the common sort. The best is always the most economical in all classes of stock on the farm.

In the improvement of farm stock through breeding the first item for thought is, what do you want to accomplish? Get that well thought out, firmly established in your mind and then try to attain to it. Mark out your course and then stick to it.

If you aim to breed throughbred stock, whether horses, cattle, sheep or any other class of live stock get a worthy ideal in your mind and then breed to it, for without a fixed idea on breeding you may gather the best blood on your farm and yet not make progress. To particularize, let me say, if you want to breed draft horses make calls on the blood of the breeds that are noted for massive frames, great weight and strong limbs, and do not admit of a drop of running or trotting blood, on the false theory that thereby you may add activity and spirit to your colts, for soon you will have mongrels, neither pullers or goers. If you wish to improve the spirit and action of the draft horse, do so within the

breed, thereby not frittering away the main excellence of your stock by the admission of antagonistic blood.

If you want roadster horses select sire and dam of the best type attainable for the purpose in view, and when you have made some progress do not squander your efforts by admitting blood from any of the draft breeds on the specious plea that it will give strength and size, remember that it will also give cumbrous and uncomely form, and take from your colts their elastic tread and proud carriage, and set you backward by giving your horse the slow motion and heavy step which is quite as characteristic of the draft blood as weight and power. If you desire greater size in your roadsters seek it in allied families and add to their bone by breeding to strong-limbed horses of kindred blood.

Why is it that five, ten and even twenty thousand dollars is sometimes paid for colts in a certain line of breeding? Is it not because they are members of a family that have trotted long and fast, or in which the habit to run and win has been fixed for generations past? Or with cattle for which large sums have been paid, has it not been for those bred in a straight line for generations back and which now have the power, and to a certainty stamp their own impress upon their progeny? Therefore, I repeat, stick to the ideal which you have fixed in your mind, and whatever the breed may be go only to those families that have become renowned in the line of your breeding.

What we have said of the breeding of the horse applies with almost equal force to the breeding of other live stock.

We have heard much of the general-purpose cow—as yet where is she to be found? The only successful cross breeding we know of is to mate a pure bred sire with the common stock of the country and breed up in that line as fast as possible. In this way improvement is real.

Feed and climate, 'tis true, have much to do in the development of animals, but the frame work of it is blood.

We have many breeds of cattle and each seems to have its sphere to fill. Since the organization of fat cattle exhibitions, experiments in feeding have been made to learn the value which one breed possesses over another for beef purposes. These experiments have shown some unexpected results. First, that one breed possesses no peculiar advantage over another in the cost of producing a pound of meat. Second, that while one breed may give more profit to the producer, another gives more profit to the butcher and consumer.

It is safe to say, however, that nothing but grades, well up to full bloods and thoroughbred of the beef breeds, should be bred for beef. We would then have a stock of cattle that would be a credit to our state and a pleasure to the owner, for we all take an honest pride in the beautiful symmetry of a perfect animal, while for the common scrub cattle, we have, or should have, the utmost feeling of disgust. Good stock will sell at any time, at a fair profit to the owner, and is sought after by the best buyers, the same pasturage keeping the high grade or thoroughbred, that is required to keep the common sort, the former in a salable condition at any time maturing early, making a choice meat and nearly double the amount of it at the same age, and bringing from one to two cents per pound more in market, live weight, than the other, and fit to go to any market in the world.

For the dairy a different type of an animal should be bred, than for beef. The cow is the primary factor in dairying, and unless she is a good one, you can hardly expect to receive any profit in the keeping of her. As the calf is the mother to the cow, and as farmers must

breed some sort of calves for the purpose of keeping up the supply of milk, it is of great importance to him that the calf should be good. For its breeding the farmer should be quite sure that its sire is as good at least as the dam, and during its early infancy he should bestow upon it much thought and attention. Why is so much claimed for the calf? Because it has come of a parentage whose sole occupation in life is to furnish food daily for nine or ten months of the year for the years to come of her life, and to do this requires a nervous organization strong enough to resist any reasonable amount of wear and tear, and delicate enough to respond to a liberal and rational method of feeding for butter production. The cow for the dairy no less than the animal intended for making beef, needs to be a heavy feeder. In fact, there is greater necessity, since the production of a large yield of milk, demands stronger digestive powers than are required for laying on of fat. If the calf is constitutionally a poor feeder, do not try to make a cow of it, for it will be a disappointment. But before you turn the calf over to the butcher, make sure the fault is its, rather than your own. Poor feeding, either by irregularity or disproportioned rations, weakens the digestive organs. The most common mistake in feeding calves with other than milk, is in giving too rich food, and that containing too little material for making growth. It is well, after the calf is three or four months old, to give it as great variety of feed as possible. If the calf becomes accustomed to eat anything set before it, the habit will last through life, and a cow thus reared will improve her dairy qualities and transmit these characteristics to her young.

Another point in the breeding of cattle for dairy purposes, is the selection of the bull from a good dairy cow. The dairyman acts foolish indeed, who, having a good herd of capital milkers should take a bull haphazard, not knowing whether his dam was a good milker or not. Carelessness in the selection of the bull may go unpunished once or twice, but we shall find that the law which in the long run governs averages and percentages, is very much against the breeder who fails to exercise care upon this important point of the sire's descent from first-rate dairy stock.

Coupling the fact of the comparative scarcity of dairy cows of the very best class, with the potency of the sire's influence in the transmission of those properties which make cows good, bad, or midling milkers, and decide the quality of their milk, we are compelled to admit the probability of evil results, eventually, in herds for which bulls are obtained without sufficient attention to the dairy properties of their dams.

Success in such herds is mainly accidental and is likely to be but temporary. But there is more to be gathered and it leads us beyond the dam of the bull. It brings us to his sire and through his sire, to the sire's dam, reminding us that unless she was also a good dairy cow, her shortcomings must in all probability, almost to a certainty, reduce the effect of his dam's influence, and so lessen the chance of the transmission of her extraordinary goodness to his offspring.

We must proceed a little further, if we would have anything like security of inheritance. We must look as far as possible into the direct female line of the sire, and of his sire too, and if we can trace back to the dams of the next antecedent sire and of the male ancestors beyond them and find a good dairy record, for each tributary we shall have reason to expect under, judicious management, a large percentage of good dairy cows, as the off-spring of our bull in a good dairy herd.

The average farmer sometimes has an excuse, to some extent admissible, for not having better stock. None however have any right to ask to be excused for not improving upon what they already have.

To those then who are striving to obtain a living from the dairy let me say, select good native cows or grades of other pure dairy breeds, cows of known ability for butter production, as a foundation, for upon the degree of quality represented in this foundation, depends the certainty and rapidity of the success to follow. Breed these to a pure blooded bull from one of the dairy breeds, raising the heifer calves, if they are good feeders, but the male calves, either send them to the butcher for veal or make steers of them. The heifers at a proper age bred to a thoroughbred bull will produce three-quarter bloods, and in a few years a valuable herd for dairy purposes will be formed.

This system of breeding will give you at least a good farm cow, a term which has some significance. It means a cow that will pay well for her keep. As a cow, (the principal purpose of keeping her, if the purpose is intelligent) is for the production of milk, butter and cheese, we should proceed in the selection and breeding of our cows with one thought clearly fixed in our mind and that is, that when a good profitable milch cow is old enough to turn off, the price we shall get for her carcass—of whatever breed she may be—will never make us sick. The market is not groaning for old cow beef.

We may observe all through the range of animal life that the amount of energy expended for profitable returns is in almost exact proportion to the value of breeding in the individual, and its capacity to digest well-selected food.

A well bred animal necessarily implies one having a good constitution, for without vigor, ability for work is limited.

The farmer who loves live stock will seldom err in his choice of animals for breeding.

All the really great cows in our time have been animals of marvelous functional activity. They were well built, and have been brought up in a manner becoming those having a great task before them. We cannot recall the name of a great performer on the turf without also recalling the arduous task and undaunted faith of the breeder and trainer "who builded better than he knew" by striving to impose on the high blood pedigreed animal the impress of intelligent cares and work.

The mother of Hanlan, the great oarsman, little thought when she used to row from the harbor of Toronto to the Lighthouse carrying her husband his meals that she was developing strength and skill that she would likely transmit to her then unborn son, and make him one of the greatest oarsmen of the world. She was building better than she knew.

The coupling of two animals cannot of itself produce qualities to a degree greater than the sum of that to which they exist in the animal and their ancestors. The breeding of animals can create excellence only by addition and holding the same. In the true sense of the term qualities in animals are created only by environment.

For breeding to make any improvement, there must first be one superior animal, and its superiority can come only of more favorable conditions surrounding it.

Hence improvement is made along two lines. By surrounding animals with favorable conditions and by selection in breeding. The first produces in individuals greater merit than is possessed by those animals not so happily situated; the second combines and holds this merit.

The animal of superior merit not only has more good points than the average animal, but it has fewer bad points, and when two superior animals are selected and bred their merits are doubled and their defects are divided as compared with the merits and faults of animals reproduced in their offspring. It is plain that selection in breeding can accomplish nothing unless the animals are surrounded by unusually favorable conditions. On the other hand favorable environment is of little value without selection in breeding, for the good results produced by it may be lost with the animal. There will be no aggregate retention of merit. Hence the two must go hand in hand.

Though we may breed from the best type of animals, yet, unless our management in *feed* and *protection* of stock is what it should be, we cannot expect to make it a success. We all aim to keep stock for the profit, but when we feed away all our hay and grain and have less pounds of stock—even if the animals all live—in the spring than we had at the beginning of the winter, we are throwing away, absolutely throwing away, our money. A man might just as well empty his pocket-book on the ground in the fall of the year, as to permit his stock to shrink away during the winter months. He could hardly expect to find the contents of his purse, which he threw away, and no more can he expect to make up for the loss he has sustained in the shrinkage of his stock.

To the largest number, probably, the idea of economy is rather the *saving* of what is already possessed than of *making*, by a better use of the means at their control. "A penny saved is a penny earned," they believe in very literally, forgetting that sometimes in their zeal to save a penny they may lose the making of two or more. To refrain from spending for things we do not really need, is prudence; to save our penny and deny ourselves of those things we do require, is a spurious economy. There is hardly one here who if he were to lose a few dollars from his pocketbook by accident, would not mutter and blame his ill-luck, and search for it in the hopes of finding it. A penny saved may be a good thing, but that is the better method of farming which brings in the more pennies, and spending them for those things, which add happiness and comfort to our families.

In the keeping of live stock, we hold that it is wise economy to keep only the best and to keep these in the best possible manner. My experience has taught me that the greatest profit lies in keeping the animal thriving from its birth to maturity. It may cost a little more to so keep it, but if the animal is then put upon the market, the price it brings returns to us more than the extra cost in feed. As we have before intimated, good feeding and good care must go hand in hand with good breeding, to accomplish at all satisfactory results. The great problem in feeding is so to arrange a diet which shall contain the proper proportion of the elements necessary for an economical food.

Tests in feeding has shown that what is a proper proportion for one class of animals is inadequate for another. Growing animals, as well as those in full milk, require a richer albuminoid diet than matured animals.

But I have already taken much of your time, and will only add, continue the study of this subject at your homes. Get some good work on breeding and feeding and familiarize yourselves with it. See that your animals have healthy stables to lie in, pure water to drink at all seasons of the year. The struggle for success is a sharp one, and it is neither manly or wise to depreciate success or cease to hope.

WATER STORAGE AGAINST DROUGHT.

By Dr. J. P. EDGE, *Downingtown Pa.*

My attention was first seriously directed to the advantage of irrigation while journeying through the western states and territories, during the season of 1875, in company with your secretary and other friends. I had not read up on the subject, and it was a surprise to find great flumes along the line of travel; some of them extending for thirty miles and upwards, to the snow waters of the mountains, for the purpose of bringing large supplies of water to irrigate the lands under cultivation, notably for the growing of the grape and other fruits as well as for the cereal crops.

Still greater was our surprise when we were shown the immense yields under their system of irrigation. But still greater was our wonder excited when we were conducted through the vaults wherein were stored the wines and brandies resulting from these large areas of vines. Through acre after acre were we conducted and shown great butts, each holding from twelve hundred to sixteen hundred gallons, aggregating many millions of gallons, in various forms and stages of ripening. But this was storage underground, and I may here suggest that what was left after our samplings, was in store for the need of a *dry time* for the millions.

The fact was shown us, however, that this great product had been secured by the aid of irrigation from what were otherwise considered as arid and non-productive lands, subject to long spells of drought.

My subject this afternoon is a congenial one and refers to the more desirable storage of *water* for the use and profit of mankind.

Many of the denizens of the continent of Europe drink beer and wine, as they allege, too often truly, that the water there is unfit to use as drink. But it remains true that if they had as much care to provide pure water as they put on the provision for strong drink, their motive would lose its force and become fallacious.

I may seem lacking in prudence, in speaking to you, an assembly of the farmers of Pennsylvania on the desirability of water storage, as we stand on the ruin of the phenomenal years of 1889 and 1890, with their rainfall aggregating one hundred and twenty-eight solid inches, or near eleven feet of water from rainfall; and its history of disastrous floods and crop failures from oversupply of moisture. But let us bear in mind that excess is always followed by its opposite, and the experience of the past warns us to expect seasons of drought in the near future. "To be forewarned is to be forearmed," says the proverb, and it is with a hope of stirring up some interest in the subject of irrigation, that I am here to speak of water storage.

Our seasons are yearly showing more variableness, subject to local, but often long periods of rainfall or its opposite, so that this question of cloud water is too often one of plus or minus in extremes. And where no means are used to store the overflow a double loss is the danger; whereas in those districts where the planter depends on irrigation, he little heeds the clouds or rainfall.

Pennsylvania can stand against the world, perhaps, in her grand system of drainage, by which every mountain, hill and vale pour out their tribute to the sea. There is no stagnation in our general drainage

system, and the volume of water daily flowing out from the sources of her streams is simply beyond estimate or imagination.

We have only to look over the map of the state to see the grand system of drainage, through the great rivers that have their origin in or flow through it to the sea.

It comes back to us in the form of snow, rain, fogs or dew, but not always as or when we most need it, and the man who thirstily provides for the day of want is an example, and has his reward. The results on record, within our reach, are such as should satisfy every one of its utility where and when properly applied. Known among the most ancient husbandmen, it has been used in all ages and countries more or less, and is still depended on by whole nations to secure successful crops, with which to feed the millions. In our own country the dwellers on the territory west of the one hundredth parallel, with the exception of a portion of the more northern parts, depend exclusively on irrigation in some form. By its use the mountain slopes and arid plains of what we had all been taught to dread, as the great American desert, the abode only of wild beasts and wilder Indians, have been made to yield the most exuberant growth, not only of cereal and forage crops, but forest and fruit trees, and vineyards borne down with the weight of the purple grape.

Our centennial sister young Colorado, just entering her teens, is gridironed with canals, tunnels and ditches that have converted her treeless prairies into gardens of verdure and rich return.

Millions of the capital of her people, individual or associated, have been profitably invested in these works. And while in the sources of her streams flowing from the fastnesses of the rockies, great reservoirs holding hundreds of millions of cubic feet of water exist, the ranchman and farmer has no fear from absence of rainfall. For when he sows his arid purchase with grain or forage, or plants his orchard or vineyard, he goes to the water company and buys what water may be required, or dots the landscape with great winged pumps that throw water from deep wells to the summit of the divide from where it can be conveyed as wanted.

In a letter received from Secretary Annis of the State Board of Agriculture of Colorado he describes one of the very many great works of the kind in that state. A company with which he is connected has a storage lake fed by the melting of the perpetual snows, in the fastnesses of the mountains, and from which they are only allowed to draw at a certain times, by other companies below; and having a capacity of two hundred millions cubic feet of water, covering an area of two hundred and twenty-five acres, with an average depth of twenty feet. Its capacity is a flow of one hundred and twenty cubic feet per second for eighteen days, and it is one of a service of many more on the same source of supply.

Kansas is even more advanced and the whole state is more or less gridironed by these great storage lakes and canals. Some idea may be had of the money investment in them by reference to the vast system owned by Dr. Soule in Ford and Edwards counties one of which is ninety six miles long and forty-five feet wide carries five of feet water. It has two hundred and fifty miles of laterals some of which extend fifteen miles from the canal. He has recently sold this system to an English syndicate for \$1,000,000. One million invested in Pennsylvania would reach and enrich vastly more acres than is done by this grand system in Kansas.

Utah, New Mexico, Arizona and California are even yet more advanced and many millions of dollars have been profitably invested in irrigation.

We have the results right here at our own doors. There is not an eight by ten grocery in Pennsylvania, but what is more or less stocked up with California or other fruits of the most perfect and tempting kinds, that are underselling our own productions if we are fortunate enough to have any in our own markets; preferred by their excellence and cheapness. After being packed in the best of forms, and transported for four thousand miles in refrigerators under expensive railroad traffics, they are offered us at prices within reach of the humblest; and yet we are continually harping on crop failures, and the ruin that stares our farmers in the face, *from foreign competition*. If a tariff was put on laziness, or if these growlers who sit on the fence, or on the corner store box, and are everlastingly trying to masticate that old dry chestnut that "farming don't pay," would throw off their coats and use the means that God has bountifully put within their reach to secure them against drought, in the maturing season of their crops, they would have some hope of rescue from the blue ruin they see ahead.

The cave or cliff dwellers and the Aztecs after them, and South America in the days of the Incas and beyond, were familiar with the benefits of water storage, as shown by the ruins of extensive canals and mountain reservoirs.

But, in India and China we find the most wonderful provisions in this line. I need only refer to one, that on the Ganges at Hurdwar, which has distributing canals nine hundred miles long and irrigates over 11,000,000 acres.

By this means India is able to feed a population that on the Pennsylvania system of farming, would soon be wiped out of existence by starvation.

But you may say that these expensive works are not adopted to or required in Pennsylvania. Admitted, and yet it remains true that the farmers of Pennsylvania are annually suffering great loss in neglecting to use the facilities at their command, to do, *at little expense*, what pays so largely at great cost elsewhere. What we want here is to control our rivulets and springheads in small lakes or ponds to use as occasion may require by improved ditches, covering at least a portion of our farms. And I am firmly of the opinion that there are thousands of landholders in Pennsylvania who could not more profitably employ a portion of their acres than in small lakes or ponds from which water could be conveyed to meet the demand of growing crops.

Now, as I have already said Pennsylvania has, in an eminent degree, the facilities for providing against the disasters sure to follow protracted drought during the growing or more especially the maturing season, and the aftermath pasture.

I must refer you to authorities for the details of advantages in this line, the purpose here being rather suggestive than as an argument, with the hope of stirring up discussion and experiment.

You all very well know from disastrous experience, that however promising your growing crops may appear, in their early stages, if perchance there come a protracted "dry spell," covering the maturing season, or the most important season for pasturage, the farmer who has not the provision for supplying moisture to his soil must stand by and see his hopes blighted and his labor without its due reward. No scolding or repining at the providences of God will hold good to him

who has failed to avail himself of the provision which the good Lord has made for him, but he must in every case charge the loss to the account of laziness or unprovidence. The provident man on the contrary in his industry shall realize the truth of the Psalmist where he says and "shall be like a tree planted by the rivers of water, that bringeth forth his fruit in its season; his leaf also shall not wither, and whatsoever he doeth shall prosper."

If any of my hearers don't believe in irrigation, let him, the coming season, improvise the means for watering one-half of his strawberry patch, if it be only with the aid of a sprinkler, which is easily made from an old barrel, and carefully note the difference in yield of the two parts. If he shall make a fair trial he will, after he has eaten the fruit or sold it, be a convert to irrigation. He may try it as well on his garden stock, his potatoes or his sweet corn with the same result, of doubling or possibly quadrupling the yield. In strawberries, six hundred bushels to the acre has been attained.

There are two resulting uses to which these water preserves can be profitably applied; one is the planting of fruit trees on their borders or grape vines. We know that the superior quality and increased quantity and with much greater certainty of crops of apples, pears, peaches, grapes, or stone fruits in the lake regions of New York, Michigan and other lake regions, is due to the influence of these bodies of water on the atmosphere, by which the trees and vines are supplied with the required elements to perfect their growth and fruitage.

The effect of evaporation on the neighboring vegetation is not a mean item in estimating the outputs of water storage on the farm. And the planting of fruit trees, basket willows, grape vines, etc., is a subject that will bear close study, in this connection.

Another possibility is the propagation of food fish, frogs, terrapins, or water fowl, out of any one of which special lists some can figure out a colossal profit to the industrious, as these luxuries always command fancy prices and a ready market.

I have briefly set before you some of the advantages arising from the storage of fine water. No attempt has been made at detail, or estimate of cost, as each farmer would be guided by the surrounding conditions.

Now as I said in the subject, Pennsylvania has, in an eminent degree, the facilities for providing against the disasters sure to follow protracted drought during the growing and especially the grain maturing season, and the aftermath grass crops in the pastur ranges.

I must refer you to authorities for the detailed evidence of the influence of irrigation on the crop yield, the purpose of this paper being simply to call attention to the general subject, and the incentives for every land owner to make use of his chances in this direction. And I trust that my paper will excite discussion not only here but among farmers in their home circles and clubs.

THE FENCE LAWS OF PENNSYLVANIA.

By HON. H. B. PACKER, *Wellsboro', Pa.*

(An address at the Wellsboro' meeting.)

Having been invited to address you upon the fence laws of Pennsylvania, I will undertake to give you a brief history of the more important legislation upon this subject to the present time. It is a question that has agitated the people of this state from the time of William Penn—when this territory was a province, under what was known as the common law, the law brought here from England by our ancestors, and has prevailed here during colonial times and since, as modified by acts of assembly, which have been passed from time to time. Under the common law, the owner of stock was liable for the trespass of same upon his neighbor's fields. If a man permitted his cattle to rove about and in their wanderings they invaded the improved lands of his neighbor, trampled upon and destroyed his grain, he was answerable for the damage done by his cattle. The theory of the common law is that a man's real estate, his plantation, should be held inviolate—that the man walking across it is a trespasser. That the owner is not obliged to inclose it with a fence or wall to indicate the lines and boundaries, as a notice and menace against intrusion. In the eye of the law, every man's land is supposed to be inclosed and set apart from that of his neighbors. This law prevailed here prior to the enactment of 1700. The country being new and sparsely settled, most of the land unimproved and a wilderness, the common law was deemed inadequate and unsatisfactory. In the year 1700 was passed the first important statute on this subject. In order that you may have a clear idea of this piece of legislation, which has played such an important part in our fence laws since that remote period of time, I will quote the greater part of the first section. "For preventing all disputes and differences that may arise through the neglect or insufficiency of fences in this province, and counties annexed, be it enacted, That all cornfields and grounds kept for inclosures, within the said province and counties annexed, shall be well fenced, with fence at least five feet high, of sufficient rail or logs, and close at the bottom; and whosoever, not having their grounds inclosed with such fence as aforesaid, shall hurt, kill or do damage to any horse, kine, sheep, hogs or goats of any other persons, by hunting or driving out of or from the said grounds, shall be liable to make good all damages sustained thereby to the owner of the said cattle: *Provided* * * *

* * * But if any horse, kine, sheep, hogs or goats, or any kind of cattle shall break into any man's inclosure, the fence being of the aforesaid height and sufficiency, and by the view of two persons, for that purpose appointed by the county court, found and approved to be such, then the owner of such cattle shall be liable to make good all damages to the owner of the enclosure." It will be borne in mind that this act defines what shall constitute a legal fence, viz: "with fence at least five feet high of sufficient rail or logs and close at the bottom." Persons having such fence and stock breaking into, "any man's inclosure then the owner of such cattle shall be liable to make good all damages to the owner of the enclosure." Unless lands were inclosed with such a fence, stock above enumerated could not be complained of for entering the enclosure and committing depredations. This law was followed by the act of 10th of May, 1729, entitled "An act for the erection of

pounds in each township of this province." The act contains provisions about strays and one section has reference to height of fences. Very many of the enactments from this early date to the time of the adoption of the present constitution were local in their character and no reference will be made to them other than those that affected and comprehended a number of counties in the state. On the 27th of March, 1784, an act was passed entitled, "An act to regulate fences and to appoint appraisers in each township in the counties of Bedford, Northumberland, Westmoreland, Washington and Fayette, and too encourage the raising of swine." Section two of this act provides, "That all fences erected in this state, within the limits hereinafter mentioned, shall be made and enacted in the following manner, that is to say: 'All worm fences shall be four feet and one-half high with sufficient stakes and riders added thereon and that the under rail in each panel shall not exceed five inches from the surface of the ground, and the first four rails in each panel shall not exceed five inches wide between the rails; and that the said fences shall have at least four feet worm; and that all post and rail fences shall be four feet and an half high, and the distance between the rails as aforesaid.'" The repealing clause of this act annuls so much of the act of May 10, 1729, as conflicts with it, also repeals so much of the act of 4th of March, 1763, "as is by this act altered or supplied." The act of 1784 remained in force in many of the counties above named and their subdivisions for long periods of time, and was the controlling fence law within said limits. Lycoming county, April 13, 1796 was formed of a part of Northumberland. Tioga, Potter and McKean were taken from Lycoming, March 26, 1804. This law of 1784 was in force in a large portion of the state, including the last named counties until the general repealing law of 11th of April, 1862. There had been different laws passed prior to the one last mentioned repealing the act of 1784 as it applied to certain localities, but it was reserved to the act of 1862 to wipe out the laws of 1784. This law having been repealed, the territory embraced within the provisions of it evidently comes under the act of 1700.

The Supreme Court in the case of *Gregg vs Gregg*, 55 Pa. State Reports, page 227, says, "The common law required the owner to keep his cattle within his close, and their intrusion on another's possession was trespass. This would be the rule in this state except for the acts of assembly imposing duties upon land-owners other than those of the English common law." "The owner of improved lands must fence them, both to restrain his cattle and to shut out the roving cattle of his neighbors. Unless improved lands are enclosed by a fence, the owner is in default and cannot maintain trespass for damages by roving cattle. The provision of the act of 1700, that the owner of such cattle shall make good all damages to the owner of the enclosure, if it be fenced according to law, implies that without such fencing there is no such legality." This decision was rendered by Justice Strong in 1868, and it has been recognized as a controlling case upon that subject; also as a clear and forcible exposition of the fence law and the responsibility of the owners of improved lands there under. This statute was enacted when the country was new, when pasturage was sought among woodlands and in waste places. The improved lands were easily inclosed by the settler and his cattle were permitted to rove over large tracts of wild land. Since the country has become improved to the extent it has been for past twenty years, the timber lands giving way to cultivated fields and prosperous com-

munities, a feeling of discontent has developed among the farms in regard to the law. As timber has become expensive and difficult to obtain, the burden of building and maintaining fences has each year increased. The useless expense and annoyance of maintaining fences for thousands of miles along the highways of this commonwealth is apparent to the landowner. During the past ten or fifteen years there has been numberless bills introduced in the legislature providing for the abolition of the fence. Owing to the numerous laws on the subject: the variety of interests involved and the disinclination to change established usage, none of them became a law prior to the act of 23d June, 1885. This act provided for the repeal of the first section of the law of 1700. The second section of the act provided, among other things, that the people of the county, after due notice given, should be permitted to vote upon the question, "in favor of repeal," or "against repeal." Many of the counties availed themselves of this opportunity afforded, and voted to repeal the law. The people in the counties of this senatorial district voted in overwhelming numbers "in favor of repeal." In many sections of the state where this law was invoked the farmers removed their fences from along the highways, and wherever they were not needed for inclosing stock: plowed the fields to edges of the roads. This law, however, was in force only a few years, when the case of *Frost v. Cherry* was taken up from Venango county and the Supreme Court declared the act unconstitutional. See *Frost v. Cherry* 122, Pa., Reports. The court, among other things therein, stated, "If there is anything now settled in the constitution it is that the legislature can no longer pass a valid local or special law regulating the affairs of counties, cities, townships, wards, boroughs or school districts. And what the legislature may not do directly, it cannot accomplish by indirection, as by classification resting upon no necessity nor reason of public policy, or by calling in the aid of the people at the polls to breathe life into an otherwise dead statute." This local option law having gone down, as a consequence the act of 1700 was revived in the counties where they had voted "for repeal" and continued in force until it was repealed by the law of 4th April, 1889. This last named act in no wise disturbs or affects any special or local laws, and only seeks in general terms to repeal the law of 1700. We can with propriety inquire what then is our status under this act? Having no general fence law applying to the whole state, it follows that there is no obligation resting upon the land owner to inclose his lands against the intrusion of roving stock. The common law is undoubtedly in full force and operation, and after a period of nearly two hundred years, abounding in a great amount and variety of legislation, we start where we began. In a recent case, *Arthurs v. Chatfield*, Judge White, of Fortieth judicial district, in an able and exhaustive opinion, says, "Since the repeal of the act of 1700 by the legislature of 1889, we are left without any general fence law at all in this commonwealth. The rule of the common law, consequently obtains, which makes it the duty of the owner of cattle to see that they are kept from trespassing upon a neighbor's land, notwithstanding such neighbor may not have the statutory fence," etc. As to the desirability of doing away with fences at this time, I have no doubt. Upon the score of economy there can be little question. The expense to the farmer of building and maintaining fences exceeds his tax and insurance account. The amount of land that is exposed for tillage, by reason of removal of fences and cultivation of the land to edge of highway is

by no means inconsiderable. During the brief time this law has been in operation the aspect of the country has been greatly changed. In many localities the fences have been taken down along the highways, the bushes and briers cut down and the accumulations of years removed, the fields plowed and cultivated to the border of the roads and all available land utilized. The long stretches of waving grain and beautiful meadows without any intervening fences to mar the effect of the landscape, presents a picture of prosperity and loveliness rarely seen under the old regime. To our adopted citizens who come here from beyond the sea, the sight must be most agreeable and familiar. To the practical experienced farmer, he sees in the change something more than an enhancement of the beauty of the scenery. He recognizes the great saving in money and labor in building fences and keeping them in repair; the increase in amount of available land, and the freedom of the meadows and plowed fields from brushes, biers and weeds, which were formerly propagated in these by-places.

MOVING FORWARD IN THE DAIRY.

By M. W. OLIVER, *Conneautville, Pa.*

(Read at Linesville Institute.)

Knowing and doing are the two great roads that lie open before us all. These are the two broad avenues by which every object of human desire must be followed. Steady thought is the great employment and object of the one; all who walk that road are engaged in a perpetual struggle to know more. In the other, work, incessant action demand the exercise of all the powers; either to learn something or to do something is the real business of every child, of every man and woman, of every hour. There is no success that is worth having, which is not earned, and earned by persistent hard work. All the paths to true success lie up-hill; the way is sometimes steep and the footing may be rough; but at every step there is something to be thankful for and something to hope for. A steady purpose in life with a determination to attempt and carry through a definite plan is the frame work, the skeleton so to speak, of a successful career. It is always worth while to have an aim and to put that aim high. Life is not a simple thing; it is wonderfully rich and complex. Whatever our special choice in life may be, though the domain is more than sufficient for a life work, yet we receive with it, if we do our best, a free gift of much that lies outside of it. I am aware that we farmers are charged with being a cautious and conservative class of people and slow to change. That we follow the line of farming our fathers and fathers' fathers practiced. This is a very serious charge to lie against us. Whatever power you are conscious of you are bound to use for the good of others no less than for your own advancement. This is the true working up to reach the level of your best and highest. True that level, it may be, is very much higher you would now dare assume.

There is no department of farming about which so much has been said and written, within the last score of years, as upon the dairy. Fully enough it would seem to have lifted our dairy products up to the

standard they should occupy. That they have not attained this standard we have only to refer to the daily reports of the butter and cheese markets for proof. They read something like this, while there is a fair demand for choice well-known brands of creamery butter, country stock is very dull. Yesterday's Pittsburgh market, as follows: fancy creamery, 31 @ 32; other brands, 25 @ 28; fancy country rolls, 18 @ 20; choice country roll, 15 @ 16; mixed county roll, 8 @ 12. Low grade and cooking, 7 @ 8; grease, 3 @ 4. Here we have seven grades of butter ranging in price from thirty-two to four cents. It is not improbable but that from adjoining farms, lands of equal value, and cows kept of the same breed, these two extreme qualities of butter were marketed.

If to the one receiving the highest price for his butter, there was but a small margin of profit the other most certainly must have met with a disastrous loss in the sale of his. Each had the same opportunities, the one accepted them and was the gainer thereby; the other refused them and in the end sustained loss. When people refuse to put themselves in the way of truth, how can they learn or when they think they know it all how can they be taught?

The cow is the primary factor in dairying and unless she is a good one you can hardly expect to receive any profit in the keeping of her. Why men will keep cows year after year that return them not more than from twenty-five to twenty-eight dollars per head, while men near them will get from fifty to sixty dollars, passes all comprehension. We can account for it in no other way than this, that the mass of dairymen, like men in other callings, get into common place ways of doing things and if they can make things come out even, they continue along in the same way, and seemingly expect to till the end of life. I suspect that the necessity of a uniform breed of cows is not fully apprehended. It would be better to have all natives than grades of all sorts. The disadvantages of a mixed breed of cows is that the milk from the different breeds will not send up its cream alike nor will such cream churn alike. I have seen it in print that a test was made with the milk of a grade Jersey and a grade Gurnsey the result of which was a difference of three pounds of butter more in a week when the milk and cream were kept separate than when mixed together. These cows as to blood were both on the butter line but what a wonderful difference—three pounds of butter from one of the cows has gone into the buttermilk. Any one who has read the results of the butter trials that have been made in the State of New York the past season could not fail to notice that the churning from the mixed breeds is low down in butter yield. It is from these ring streaked and speckled dairies that it has required all the way from twenty-three to thirty-three pounds of milk to make a pound of butter. I do not believe in the general-purpose cow, that is that a cow can be a profitable butter cow and at the same time good for everything else; but I am fully persuaded that it is as reasonable to breed for quality in milk as for quantity. In the selecting of cows for the dairy we should not fail to comprehend the fact that the cow carries with her certain distinguishing marks by which it may be readily determined whether she will prove an animal of profit or otherwise. To me it adds but little value to a young animal when the owner remarks, she will unquestionably make a great milker because her dam was, unless she carries with her certain general characteristics peculiar to all animals of particular merit in all the milking breeds. Size of the animal has been looked upon as a matter of primary importance. This

qualification in the cow is still sought after by a great many dairymen of to-day.

Very serious defects are overlooked if the size only is there. That was a hard hit given by a speaker at an institute when he said that he had faith to believe that the boys of that town were not such fools as to attempt to hunt birds with bull-dogs, but their fathers, said he, was still hunting for butter cows from beef breeds. A careful observance of certain points will very materially aid the dairyman in making a good selection of cows for his dairy. It is always safe to reject an animal with a coarse, rough, bullish appearance. Cattle as well as horses may be classified in temperament as nervous or lymphatic. The nervous in the cow is indicative of good milking power, in the horse it is associated with speed and action. The lymphatic in the cow means a tendency to lay on beef, in the horse it is found with draft and heavy weight. Milk and butter are essentially the products of nervous force.

Hence a good milker must have abundant nerve power. We mean that her organs are to be considered merely as so much nervous machinery for the accomplishment of a given end. The object of her life is to make the largest possible quantity of the best milk from the least possible consumption of food. This faculty will generally reveal itself to us in what are called the "points" of the animal. The ideal cow should have a broad forehead a wide poll. The seat of nervous power is in the brain, therefore the room for that organ should be ample. Her eyes should be bright, prominent, and yet mild-looking, if they stand out so prominent as to give the face a dished shape, the hollow up and down the face, so much the better is the indication. Such eyes promise nerve forever, if their owner be well used. A broad muzzle should be looked for. Fairly large and open nostrils is a good point. The face should be rather long, lean and clean cut. Waxy short horns and fine ears usually accompany the delicately yet strongly strung nervous organization we seek.

There is a large nervous connection from the spine to the uterus. A fine tapering neck is a desirable point. I would prefer the top of the shoulder should be sharp instead of broad. A hollow back is indicative of weakness, especially is this true in a young cow. A straight back or one slightly arched is preferable. The loin should be wide, flat and thin. The pelvis, the bony frame work whereby the hind legs are attached to the back bone for locomotion, should be broad, large and somewhat arched. A hollow pelvis may be regarded as an omen of danger from milk fever or an early break down. The ham should, yea will be, insloping and inhollowing, leaving an abundance of udder room. This shape is merely indicative of the tendency of the animal. The surface extent of the udder's attachment to the body is all important. The longer that line is the better is that point. A fleshy udder is never wanted. The milk veins are commensurate with the flow of venous blood from the udder consequently the larger the better. The chest should be deep, leaving full play for the heart and lungs—the vital organs for blood circulation and purification. Good blood promotes the activity and energy of the nervous system and thus stimulates the secretion of milk. A good barrel-shaped body with plenty of room is required to hold and permit of the proper digestion of abundance of suitable food. In such a cow the energy of digestion is in sympathy with the energy of milk secretion. Other points might be mentioned but enough has been enumerated to help the ordinary farmer in the selection of a good milker. In short the form of a good milking cow

may be briefly described as tending to the wedge shape from three points of view.

As looked at from the front we find her rather sharp on top of the shoulder and widening to the chest. As viewed from behind, along the back, broad and wide across the pelvis, and narrowing towards the shoulder. As seen from the side, deep from the back to the lower line of the udder and lighter in the fore quarters.

In the paying dairies, I care not what the breed is, you will find the cows, carrying with them the points just enumerated, predominate. Such cows supplied with an abundance of succulent food will not fail to yield a satisfactory amount of good milk. The feeding is very important. We cannot expect full results from a few feedings. They must be proper and continued. The food should be selected which is calculated to make butter fats, and then each cow should be fed according to her individual ability to digest and assimilate. This is an important lesson to learn. For if a cow is not able to increase her secretion of butter fats in proportion to the extra feed consumed then she is not a profitable cow for buttermaking. You will find many such cows even among the butter breeds and many more outside. Extra food on such is wasted. To make dairying progressive there must be more knowledge of our business and less guess work. Who of the farmers here to-day has taken the trouble to inform himself how many pounds of milk from his dairy it takes to make a pound of butter and who can tell whether his cows are bringing him twenty-five or fifty dollars per year. Again who can tell whether his breeding is such as to lessen, year by year, the amount of milk for a pound of butter or whether the amount required is on the increase. It may seem strange but it is nevertheless true that in many sections of the country it now takes more pounds of milk for a pound of cheese than formerly. Men have been breeding and feeding for quantity instead of for quality of milk. The remark is not an uncommon one that such a cow is a good one for the cheese factory. There is no truth in the remark as all good cheesemakers will bear me out in. The butter fats are as important in cheesemaking as the caesin if we are looking to profit—Whether the milk is worked into butter or cheese it is our duty, if we would be square with ourselves and our customers, to give it the best possible care and thereby receive the best possible price therefore.

The cheesemaker cannot make perfect cheese unless he has the best of milk to make it with, neither can the dairy woman make gilt-edged butter other than with cream in the best possible condition. Patrons of cheese factories fail to see that their milk is none other than in good condition so long as it is not sour. Milk may not be sour and yet is in a worse condition for making good cheese than if it were sour. Tainted milk is much more difficult to get along with than though it were sour.

The sending of the milk to the cheese factory is probably the easiest way for the housewife, but is it the most profitable way in the end? We answer yes, if you are going to continue in making butter and marketing it as in the past, and comparing it with the cream-gathering system of the past season it has paid the better. But I am of the opinion that a farmer with half dozen cows or more, if reasonably handy to market or to a railroad, can do better than to patronize either. Instead of selling your butter to-day for twenty cents it is possible for you to receive thirty or thirty-two cents. There is a greater demand for the latter priced butter than for the former. In fact the merchants

of Pittsburgh are advising their customers to hold back this grade of butter as they are unable to dispose of it. There passes through this village from a dairy farm not ten miles away two shipments each week and quite as often consigned to the grocery house for which the sender receives the highest quotation and sometimes one and two cents above. You must come in possession of modern dairy utensils if you would compete for the highest market price for your butter. We hold that no person keeping four cows and over can afford to be without a creamery, that is if they are making butter during the hot weather of July and August where the common pan is used to set the milk. How bitter is the complaint of the good wife and bitterer yet is the little cream that rises, from which she is only able to make a very inferior article of butter. Even with the creamery it is only under the most favorable conditions that an uniform article of butter is made the year around. And this is just what gives value to ones reputation, namely, the fact that you can rely upon the uniformity of the goods they produce. A ten cow creamery with refrigerators and the accompanying utensils may be had for thirty-five dollars. The difference in price between cream butter and choice country roll will average not less than eight cents per pound during the year. If but four cows are kept and from each of them but one hundred and fifty pounds of butter is made we find, after paying for the creamery, our bank account is still greater by thirteen dollars than it otherwise have been; besides the satisfaction of knowing we had sold a good article and had received a good price therefor. To obtain the best results with a creamery the milk should be set at a temperature of about ninety five and as soon as possible cooled down to a temperature of forty five degrees. If it is kept below fifty degrees the cream is ready to be removed within twelve hours after setting. The cream should now be kept at a temperature of near fifty degrees until enough has been secured for a churning; when the whole should be thoroughly mixed together, raised to a temperature of about seventy degrees then allowed to cool down, in winter, to a temperature of say sixty-six degrees to ripen, at which temperature it may be churned; in summer it may be from two to four degrees lower. After the cream has been raised to a temperature of say seventy degrees to ripen it ought to be kept about twenty-four hours in order to get the best results. Generally the reason why we are disappointed when but a small amount of butter is obtained from a large quantity of cream is because of the unripeness of a portion of the cream. You might as well give the mornings cream to the pigs as to put it in the churn with older cream, for there is where it finally goes in the buttermilk. Again, loss is quite often occasioned by the mixing of cream from cows long in milk, with that of fresh cows. Where the cream from cows of such unequal milking periods is mixed together great care should be taken that the whole be thoroughly mixed and ripened. Unless this is done a considerable portion of the slower cream is washed into the buttermilk as soon as the quicker cream comes to butter. There is a great deal in this point of unequal churning time of cream.

A dairy thermometer should be in every house where butter is made, for the purpose of testing the cream before it is churned; for if the temperature of the cream be too low, it will take a long time to churn and the yield will not be perfect. If too high the butter will come soft and salvy, and be defective in color, grain and flavor. The right temperature for churning cream raised in pans, is, in spring and summer,

from fifty-eight to sixty degrees, and in fall and winter, sixty-two to sixty-four degrees. Where cream has been raised in a creamery where ice has been used it should be churned at above two degrees higher. We have churned at seventy degrees and found the butter as solid and compact as could be conveniently worked. Stop churning while your butter is in granules. Draw off the buttermilk; then wash the butter by pouring in water and drawing off till it runs clear. Remove the butter from the churn, salt and work. Not more than one ounce of salt to the pound should be used. Some prefer brine salting, this is done by immersing the granules of butter in brine as strong as it can be made and let the butter lie in it as long as it would have taken the salt to dissolve if you had used dry salt. Brine makes a more even distribution of the saline flavor than dry salt can do, and it will relieve the butter of any excess of water it may contain just as readily as salt in crystals can and put it in readiness for marketing or packing in as little or less time.

It is thought by some that salt strikes into butter better if dry salt is worked into it, than it would if covered with brine, but this is a misapprehension of the action of salt—Neither salt or brine strikes into the butter at all. There is no affinity between butter and salt, or brine and butter. In seasoning butter with either, the salt remains in the butter only as a foreign substance mechanically mixed. When butter is gathered in the churn in the granular form it is never overchurned.

Pounding it after it is in a lump is what overchurns it. In seasoning with brine, it is never overworked for, it is not worked at all. Working out buttermilk and working in salt is where the overworking comes in and causes it finally to sell as grease. In fact working at all is overworking because, by the improved method none is needed and breaking the grain of butter by grinding in crystals of salt is also obviated by seasoning with brine. If, however, dry salt is used, use only fine dairy, and in working with the ladle press firmly against the butter but never draw the ladle over the butter, for this is what breaks the globules and causes it to have that greasy appearance so objectionable to all lovers of good butter.

The business of dairying, when intelligently and carefully followed, insures to the farmer a safe and steady income. The State of Pennsylvania is favored with all the natural advantages needed to make butter and cheese of the finest quality. And as the permanent success of the dairy industry depends upon the quality of the product, every dairy farmer should be interested in its improvement.

Therefore the utmost cleanliness in milking, in the pails and in all surroundings, must be observed to preserve the flavor and body of milk, cream and butter from contamination. Milk should be set for the separation of cream where no impure air will reach it.

I am aware there are many individual dairymen here and there throughout Pennsylvania who do now make butter of the best kind and who sell it at the top of the market; but we still have among us a class of unfortunate farmers who are still under the bonds of old customs and prejudices and who do not come up to their full measure of privileges. The man who gets interested in his cows, and their better feeding, is sure to make progress in butter manufacture, and disposal of the product. Not satisfied with an increased yield, and that made with a cheaper, because a better adapted, ration, the quality must be raised accordingly. The competition that is setting in among dairymen owing to an almost entire suspension of our export trade should be a great

educator of our dairymen. The production of poor butter and cheese can never favor consumption and to continue to make such puts one at a disadvantage that they cannot afford.

Through the instrumentality of the press much good has been accomplished and more can be. The dairy farmers as a rule are anxious to learn and improve; the manufacturers of butter and cheese will be forced to learn, if they are not anxious to do so, because the low prices they receive will be an incentive to improve. The demand for good butter has never ceased. The actual want of the day is, for the great mass of the dairymen, to get out of the old ruts which they have been blindly following and see that the product of their dairies shall be of a brand that shall command attention in the markets and not, shall I say it, disgust.

In my judgment there is no better business for Pennsylvania farmers than that of the dairy. It depletes the farm the least as compared with the raising of grain or most of special crops.

HOW SHALL WE MAKE THE FARM PAY?

By ISRAEL GARRETTSON, *Member from Adams, Biglerville, Pa.*

(Read at Riegelsville Institute.)

This depends entirely upon knowledge and agricultural training. There is no occupation requiring more varied information, a sounder judgment and more common sense than cultivating the soil and raising stock. Is this saying too much? It is a strong statement but true. The celebrated Sully said "that agriculture is the breast from which the nation derives its support and nourishment." But it is also an art. Bacon defines an art as "the disposition or modification of a thing by human skill to answer the purpose intended." Arts depending upon the skill of the hands are called useful, sometimes trades, others liberal or fine.

Now, it is plain that an art becomes more difficult in practice as its rules, and the contingencies which modify them, become more numerous. Estimated according to this standard, agriculture takes more subjects of knowledge and covers a wider field in science than any other art or profession. The physiology and pathology of brute-life; laws of hereditary; effects of crossing on breeds; the laws of plant-life; and the influence of heat, light and moisture on their growth; the best means for preserving of fruits and grains; some degree of skill in mechanism, and an acquaintance with the laws of machinery. Is this too broad? It can be reached in some degree by every farmer.

Good papers and books, agricultural literature, will always be sought and read by farmers who keep abreast of the times. The less education the members of a family possess, the poorer and cheaper will be the papers and books which they read. The man who thinks the most and the deepest enjoys the most. It is true that we now find many ignorant men who make money and a good living on a farm, but they owe much of this ability to educated men who have improved implements of all kinds, modes of cultivation and management of crops and improved breeding of domestic animals. These men take what they

have earned no right to. "They look over the fence and receive information without money and without price."

Where agriculture thrives, there we always find a prosperous people. It always has been so and doubtless it ever will be. "Be sure you are right and then go ahead," should be the watchword of every man who would farm successfully. The largest half of the profit of farming labor, and much of its real pleasure, must come out of the vigorous exercise of the worker's brain of which skilled forecast is pretty much the master-piece. Thoroughly educate the farmer in early manhood, and he will be foremost in every good work. Gray hairs and tottering footsteps will find him strong for truth, and strong in his God. And how gloriously would such a patriarch sink to rest. Where he was born and where he has lived, there he dies. In the midst of the few survivors of his early life, and of the youth who have been led by his example to the highest culture, he falls asleep. Reverently they carry his remains to the narrow house, and mourn that a great and good man has fallen. Such men there are, fixed with their descendants, on the soil.

Suppose a farmer of the olden time to come back to earth. What would he think of the ease and rapidity with which the soil is now prepared for the seed? How astonished as he watches the rapid progress of the reaper, hears the quick strokes of its keen blades and sees the waving grain disappear as if swept by surging fire. The stroke of the flail and the panting of the strong man have ceased, but he hears the clatter of the thresher, the buzz of its wheels and sees the sheaves disappear as if by magic in its insatiable throat. A thousand straw-cutters chop the straw into dainty bits, and the "Little Giant" eats the cob together with the corn. The boy rides his rake, thinks of his sweetheart and whistles "Comin' Thro' the Rye," while the grass is left in long winrows. Horses can sow and plant as well as reap and mow. Steam will thresh the grain and saw the wood and dogs churn the butter. Now, let this ancient farmer enter a store for furnishing modern implements of husbandry. Could he believe that the implements so beautifully wrought in metal and polished and woodwork painted and varnished were intended for use? Some of them look a little like the uncouth thing he once employed, but those must be made for show. And when told that the cost of those highly-polished articles is much less than the old clumsy ones would he not shake his head incredulously, doubtful whether he was in the old world he once knew?

Want of success in farming often is due to the fact that the farmer does not appreciate the dignity of his calling. Let us look at some of the considerations which should influence his decisions in this important matter.

"Experience and observation have taught, that crop-growing and stock-breeding are inseparable in the pursuits of profitable husbandry." First the farm must be suited to his means. Many farmers to-day, tired of their calling, discouraged in their efforts to improve and fail to farm at a profit, from the fact that they are in debt. It is the bane of farm life. I do not, by any means, say that a farmer should never incur debt in buying a farm, for the majority of young farmers must do this but it should be only after the most careful thought and study. It is often wiser to buy a smaller farm than to run deeply in debt for a large one. The question of the size of the farm should be determined by the means of the farmer, the particular branch of farming he intends to follow and his business capacity. Both large

and small farms have their advantages. On a large farm it will pay to invest in more labor-saving machinery and this can be kept more fully employed. More help can be kept permanently and this will enable the farmer to concentrate the labor on some particular work in an emergency.

On a large farm there is better opportunity for rotation of crops and diversified farming, and more stock can be kept, which will, under good management, not only keep the farm more fertile, but also give an equal income with less labor than where most of the soil must be cultivated. On a large farm the proportion of fencing to the number of acres may be greatly reduced, and thus one heavy item of investment and expense be materially lessened.

It must be remembered, however, that to conduct successfully a large farm, requires executive ability and business habits, and that many men can successfully carry on a small farm who would fail on a large one.

On the other hand there are many advantages connected with small farms. The man on the small farm can largely dispense with hired help and save his wife the extra labor which their board and lodging brings upon her, often when she is already overburdened with the care of children. The man on the small farm can usually control his expenses so that a failure of crops will not be so disastrous to him as to the man with a large farm. On every farm there should be an unfailing supply of pure water, convenient to house and barn. Convenience to postoffice, store, blacksmith shop, schools and churches, will add largely to the income of the farm and comforts of the farmer and his family.

All the profits in farming come from maximum crops and taking care of the little details. From the statistics, as shown by the census reports of the United States, it appears that the average yield of the corn crop is about twenty-six bushels per acre, and that the average yield of the wheat crop is about thirteen bushels per acre. That these averages will give no profit is evident to every experienced farmer, and as these are the averages there must be many who grow less, for we know that there are many who grow much more to the acre. We might then divide farmers into three classes—those who are growing crops above the average and make money, those who grow average crops and make a living, and those who grow crops below the average and barely keep soul and body together. The man who cultivates a smaller part of his land can do it more thoroughly and can have it richer.

The cost of grain per bushel is decreased in the exact ratio that the yield per acre is increased. Suppose we take twelve dollars as the average cost of producing an acre of wheat or corn, this sum to cover rent of land, preparation of soil, planting, cutting and harvesting. A crop of wheat averaging twelve bushels per acre will cost one dollar per bushel. Twenty bushels will bring the cost down to sixty cents per bushel, and thirty bushels per acre will cost but forty cents per bushel. Thirty bushels of corn to the acre will cost forty cents per bushel, forty bushels per acre will cost thirty cents per bushel, and sixty bushels will cost but twenty cents per bushel. You may think my estimate of twelve dollars per acre incorrect, but take any other amount you please, and it will not change the principle. Now the surest way on many farms is to double the yield per acre, and so reduce the cost per bushel, would be to reduce the acres under cultivation one-half.

A careful study of this subject of farm management shows that brains on the farm count for more than muscle, and that success depends more on a systematic plan, wisely chosen and faithfully executed, than on physical labor.

ORGANIZATION OF FARMERS.

By H. M. GUTTSHALL, *Meadville, Pa.*

(Read at Kittanning Institute.)

Having been invited to read a paper at this institute and being here for that purpose, I wish to congratulate the farmers of Armstrong county and the farmers of the great State of Pennsylvania for the privileges we have as agriculturists of coming together to exchange views which will aid us in our labors as tillers of the soil. I have been asked to read or deliver an address on the subject of "Organization of Farmers."

Every other interest or business in existence has seen the necessity of such an organization as would benefit them, and they have acted accordingly, and the advancements which they have made is proof positive, and cannot be contradicted that organization is beneficial.

It remains for farmers to be the last of all those engaged in any industry to attempt organization, and thereby seek to regain the proud position which they ought to maintain in this land of plenty, where it would seem a bountiful Creator had intended to be the fittest place for man to reside.

I am not here to advocate the "organization of farmers" in the sense, or in the way rather, so much talked and written about by fault-finders and constitutional grumblers and complainers; but, on the contrary, I am here to call the attention of those of my class to our actual condition, seeking honestly after the cause and then, how to apply the remedy.

I am not one of the number who advocate or believe that farmers are the most downtrodden and worst-abused class of people on earth; and yet I believe that we bear certain unjust burdens of which we can and will find relief, and I firmly believe that that relief can the sooner be brought about by organizing the farmers, and by that organization teach them the true cause of their depression.

Many of the thinking men of our class are coming, indeed they have already arrived, at the conclusion that organization is necessary.

The man must be blind indeed who cannot see the need of it. Look for a moment at the success of other interests which have been for years acting together as one man. Have they not succeeded? It would be presuming upon the intelligence of this or any other audience of intelligent people to dwell upon this point at length. The organization is necessary, is settled, and the question of *how* to organize, is the all important one. What shall it be?

An article in one of the leading agricultural papers of this country on this question brought forth several answers each one championing the organization to which he belonged, no doubt.

On one point they agreed and that one was the need of some organization. One writer was enthusiastic about the "Wheel," an organ-

ization which is at present making prodigious growth in some of our southern states. He believed that it was the way, that by and through its influence all of the evils of this life as far, as farmers are concerned, could be wiped out. Another advocated the Farmers' Alliance, and the workings of that order was tersely explained. Another advocated the "Grange," The Order of the Patrons of Husbandry with its township, county, state and national organizations as being the most firmly planted and containing well-tried principles which were proving beneficial to its members. Another advocated the "Farmers' Club," with its long years of experience, and high character of its membership, as the most eminent and best qualified to serve the people who were eligible to membership.

The opinion of the men who wrote these articles are worth no more, nor do they differ from those of thousands of others all over this land of ours, the fact was brought out that all believed "organization" necessary. When we have an organization how are we to be benefited? This is the all-important question. Some men believe that the mission of any, or all, the organizations of the farmers is to go up to Washington and take charge of the treasury department and loan money to the people at a low rate of interest. They are hard up, and wish to borrow money, little do they realize that it is not the province of a government to loan money to individuals. Others have an idea that all the evils of this life, and our condition, when prices are low, and our products plenty, are due to the fact that the state, in its legislative capacity, has been legislating against their interest. These and many other ideas, are made the leading feature of meetings, and the true object of farmers' organization, as it can be made useful and benefited to its members, is lost sight of entirely.

What would you have the leading feature of a farmers' organization, asks one? I would have it agriculture. 1. By having its membership farmers, their wives and families. Discarding lawyers, doctors, ministers, bankers, merchants, and all professional men from our ranks. In saying this I do not wish it understood that I am against any one of those who are engaged in any of the above-named professions. I simply mean that they have no business in our organizations. They would look upon a farmer who would make application to join a society composed of members of any of these professions as one having "cheek" indeed; and yet I would ask if it would not be just as consistent for a farmer who was not a banker, to belong to a bankers' organization as for a banker who never owned an acre of land and knew nothing about the business to belong to a farmers' organization. In an organization for farmers we need only those engaged in agriculture.

We need the organization as a means of breaking up the isolated condition of farm life. People living on farms if they live there actually, and some only stay, need some place where they can meet together. To do this they must have some place in which to meet. A good hall, well furnished, containing chairs, or settees, lamps, stoves, tables, dishes and everything necessary for having dinners or suppers, a good platform, etc.

Get all the young men and ladies of the neighborhood to join; have a system about your meetings; adopt by-laws, and conform strictly to them; do the business of the meetings in a business way, thereby teaching your children how to transact business.

Such a place as this, with meetings at least every two weeks, will go far toward solving the question so much talked, and written about:

"How to keep the boys on the farm?" Parents neglect these things, they fail to do their duty toward their children, they forget that they were young once, and this neglect, this forgetting, soon makes farm life monotonous and the young people leave the farm for other more enticing walks of life. When this awakening comes to farmers, when they see things in their true light, many boys will take a more active interest at home, farming will be more profitable and will be of more interest to the young.

To break up this constantly-increasing isolation of life on the farm, ought to be the leading feature of farmers' organizations.

The intellectual feature should take second place, and opens up a wide field for action.

The easy-going, slipshod manner in which a large majority of farming is done if brought down to a business system would surprise many farmers, and where there is to-day no money in farming, and a condition bordering on bankruptcy, there would be prosperity and contentment. To attempt to enumerate the varied and many things done, or left undone, would occupy more time that one should occupy in a meeting like this.

Improvement in farm buildings, so that stock might be wintered with the most comfort to them, and at the least outlay of feed, should be studied, advice from others should be asked, personal observations made and then put into practice. It is useless to expect stock to endure the storms of a cold winter, or warm one either, as rain and sudden changes are about as dangerous as the most violent cold, as they used to do when our fathers were boys and when the forests afforded protection from storms. Seasons change and we must keep pace with nature or be left behind.

Improving our stock must come in for a share of our attention.

Long-nosed, razor-backed, cat-hammed hogs find no place in the markets, and they are poor machines with which to convert our corn into pork. This class of farm stock is not alone in its development and perfection, enterprising breeders have made it possible for all to be benefited, they having given every kind of stock on the farm their attention, and there is no excuse to-day for these ill-shaped carcasses of beef, mutton and pork which is sent to market at no profit to the owner, and a positive detriment to the business of farming.

With these improved breeds of stock on our farms, and using good care and judgment in feeding, there is profit in any branch of stock, although, we must confess, some kinds are very low in price.

While a farmers' organization is in the main working in the above named direction, they need not be derelict in their duty in other ways.

There is a duty which each and every farmer owes to his country, and in order to do that duty well he should be conversant with its laws, and the entire management of our government, state, county and township affairs. There is no place better fitted for gaining this necessary information than in a meeting composed of farmers, and perhaps those of other professions. It is in the quiet of such meetings and in the absence of political party excitement that those economical questions, which affect the masses of the people, can be fairly discussed.

The zeal with which interested parties enter into our state and national election campaigns may not indicate a healthy growth for continuing the future prosperity of our great and increasing nation of freemen.

The honest yeomanry of America during the revolution who sacrificed so much for liberty and equality, assisted in laying the foundation for

one of the grandest governments on the face of the earth. The sacrifices which they made should not be in vain.

The liberty, which we as a nation enjoy, has been purchased at too great cost of blood and treasure to be even tampered with.

Legislation which tends to depriving the people of a voice in every branch of government is against the spirit of the constitution under which we live. While the people have been thoughtless about their own welfare, interested parties have been so shaping the laws of our state, that at present, unjust burdens are placed upon the shoulders of those who own the real estate, and privileged persons are not contributing their equal share toward supporting the state, county, and municipal affairs of the commonwealth. This we claim is against the clear and clear cut provisions of our state constitution. In asking for a remedy for these wrongs we are asking for no special favors. Simply asking equality, that is all.

In this work we must have organized effort in order to win. The failure to get relief in the last two sessions of the legislature should not discourage us in the least.

It is no great credit to us as a class that two distinct bills were presented to the last legislature. One framed by the State Grange, an organization which represents the farmers of the state closer than any other organized body in the state, and, one by the county commissioners who are perhaps second in their close proximity to the owners of real estate, and yet these bills were so wide apart in their make-up, that all attempts to unite on a bill, fair in its propositions failed and proved disastrous to both. This is not the way to obtain necessary and needed legislation.

What we want is equality, and a bill should be prepared by the commission created for the purpose so plain, so fair in all its provisions that every species of property should be brought to light and be made to pay its equal share of the taxation in the state.

Organize, study this question and then act. A superhuman effort is being made this winter to improve the roads of the state, this commendable work should receive the approval and support of every good citizen, but be watchful, any attempt to do this work by bonding townships and increasing the cash tax already burdensome, nearly to oppression, should be frowned upon. The matter will, without doubt, come up for action at the next session of the legislature, be ready to meet it.

Roads can be improved with the improved road machinery we have at present. Let the road supervisors appoint men of judgement and enterprise as path masters, and make the best of the system we have already, where this is done there is a good amount of improvement already noticeable and it can be continued until good roads will be the rule. Use your farmers' organization for all these purposes, and not only farmers but all classes of citizens will be benefited.

It is not my wish to advise or propose what kind of an organization you may have. The "farmers' club" has been long in existence and in places it is doing a grand work. Could we have such "farmers' clubs" distributed all over the country as exists at Hornellsville, N. Y., where nearly eight hundred votes were cast in electing a vice president, we would say organize a Farmers' Club.

Some advocate "The Wheel" an order that is spreading over many southern states.

Some are loud in their praises of the "Farmers' Alliance," an organ-

ization which is making great headway in many states. Others are enthusiastic about the "Patrons of Husbandry," and think that this order has more good features than any of those mentioned. Any one will no doubt have desired effect of bringing the farmers together for council and consequent action. All of these organizations no doubt have valuable features. It is the *duty*, and I wish to emphasize the word, for every former to unite with some society of agriculturists and work for the benefit and success of the business in which they are engaged to the end that it may afford more profits and comfort for those engaged therein.

The air seems pregnant with the desire of those engaged in this grandest and noblest of callings to unite together and work for bettering their condition. All the leading agricultural papers are giving this matter their attention. Aid them in this work. Let those of us who see our way clear, renew our interest in the work, go out into the highways and gather in the thoughtless, and the good work which will be accomplished will cause generations yet unborn to showers praises on those who were instrumental in handing down to them a country in which we can continue in the future as in the past, to justly call the "Land of the free and home of the brave."

THE ORGANIZATION OF FARMERS.

By E. REEDER, *Member from Bucks county, New Hope, Pa.*

Agricultural organizations have been in existence since the early part of the present century, and yet now, near its close, agriculturists are not organized as they should be. A call for an agricultural meeting and exhibition of imported stock was issued in August, 1811, to be held in my native township of Solebury, Bucks county, Pa. This call was signed by Joseph Eastburn (and others), my great grandfather, who was one of the managers and an exhibitor of imported cattle and sheep. There was an effort made to organize a county Agricultural Society as early as 1818, but it was of short duration. The first permanent county agricultural society in our county was started in 1843, and held its first exhibition in the fall of 1844. I became a member of this society in 1851. It held its annual exhibitions regularly, and flourished until 1865, when the present Doylestown agricultural society was organized. This is the society I have had the honor to represent in the State Board of Agriculture since the organization of the Board. The Solebury Farmers' Club was organized in 1871, sixty years after the first exhibition was held in the township. This club is now near twenty years old, and has attained not only a state, but a national reputation.

My plan for the organization of farmers, consists of township, county, state and national organization, with the Department of Agriculture at Washington as the head; and to which the state, county and township organizations should be tributary; and with which they should all be in a close, regular, monthly correspondence.

Am I asked why I advocate the organization of farmers? My answer is, the object is two-fold: First, mutual improvement, and second, mutual protection. We have had, since 1811, a period of eighty years

of agricultural fairs and exhibitions, and meetings for the education and improvement of agriculturists; and now it may seem strange that it should be thought necessary for them to organize for mutual protection. They have been the first to organize for improvement, and are now the last to organize for protection. Indeed the organization of farmers for protection has become a matter of necessity. All other avocations of life are organized for the protection of their interests, and the organization of farmers becomes a matter of self-preservation.

Agriculture is the foundation industry, not only of our state and nation, but of the world. All other avocations are dependent upon this one for their existence. Upon our prosperity their success depends, and upon our failure their ruin will speedily follow.

It is not my purpose in the present paper to inquire into the causes of the present depressed condition of our agriculture. It shall be my purpose now to endeavor to seek the remedy. Agricultural depression is one of the current topics of the times, and although we have our meetings for recreation and rejoicing, there is a spirit of depression abroad in the land.

I desire to lay down the following proposition, as the corner stone, or basic principle, of my argument: Agriculturists must organize to regulate and control production, and establish the prices of their products. They cannot secure the latter without an observance of the former. The old questions which have been rung in our ears ever since we were born, of "How much will you *give* for what we have to sell?" and "How much will you *take* for what we have to buy?" and the farmers must henceforth take rank alongside of all other avocations in life, and set the prices upon the products of his own labor. When I first announced this proposition to the members of our farmers' club last winter, it was received with mingled feelings of astonishment and disapproval. "Control production! wild—impracticable—impossible." "Establish prices! folly, visionary, and even wrong." These were some of the exclamations and answers that greeted my ears. The law of supply and demand, I was told, can alone establish and control prices. Admit it. Then let farmers organize to regulate and control the supply; not by compulsion, not by any arbitrary measures, but by a mutual understanding and agreement. "Whatsoever ye would that men shall do unto you, do ye even so unto them," remains as true to-day as when it was first spoken; as true now as ever it was. Therefore, if ye would that men should pay you *your* prices for the produce of your labor, why not pay them the prices they demand for the produce of their labor? As a matter of right, of principle, the proposition is well founded. The only question is on the ground of practicability or expediency.

Men in all conditions of life have their stated yearly incomes, from the lowest daily laborer with an income of two or three hundred dollars, to the highest railroad president, with an income of forty or fifty thousand dollars a year. When a teacher, or a clerk, or a salesman, gets an income of two or three thousand dollars a year, we say he has a good position; he ought to do well, and make money. What is the income of the farmer? The average receipts from his acres of improved land in Pennsylvania are less than ten dollars, and from his farm of one hundred acres less than one thousand dollars, a year. Out of this he must pay taxes, pay for repairs, for labor, for fertilizers, for mechanics' bills of all kinds, must feed and clothe his family and educate his

imported goods and what they are costing us, and then contrast them with some of our principal articles of export, and what we are getting for them. This will enable us to see whether we can produce the imported article here at a less cost, and also show whether the exported article, and the price received for it, could not have been used to a better advantage in our own country.

HORSES.

In the year 1889 we imported 11,078 horses costing \$2,995,409, at an average cost of two hundred and seventy dollars. These horses were admitted free of duty. In the same year we also imported 43,417 horses upon which duty was paid, costing \$2,052,346, at an average price of forty-seven dollars, making altogether over five millions of dollars for imported horses annually. Our exports of horses are very insignificant, amounting only to \$689,964. The balance of trade in this respect is heavily against us, and shows that a wide field is open to our farmers to raise more horses.

EGGS.

The next item which we are importing quite largely is eggs. In 1889 we imported 14,585,550 dozens of eggs, costing \$2,071,614, being an average price of fourteen cents per dozen. Why not feed up some of our surplus wheat and produce these eggs here?

HAY.

The next item to which I will call attention, and of which we are importing millions of dollars' worth, is hay. The same year (1889) we imported 116,809 tons of hay, costing \$1,183,184, being an average price of over ten dollars per ton. The duty upon hay is two dollars per ton. If hay can be imported into this country and sold at a cost of twelve dollars per ton, we ought to be getting better prices for our hay than we are. There is something wrong somewhere and it should be the business of farmers' organizations to look it up.

POTATOES.

The next item to which I will call attention is potatoes. In 1889 we imported 1,506,846 bushels of potatoes, costing \$504,369 at an average price of thirty-three cents per bushel. In the year 1888 we imported 6,491,057 bushels of potatoes, costing \$3,051,067, an average of forty-seven cents per bushel. Why not raise more potatoes to feed our own people when we can get fifty to sixty cents a bushel for them. This would be getting from fifty to one hundred dollars per acre from our land which is better than grain raising. We ought to raise at least six millions of bushels of potatoes more than we do. In the year 1879 the crop of potatoes in this country was 169,458,539 bushels or about three bushels a year for each inhabitant.

WOOL.

The next and last item to which I will call attention in this list of imported articles is wool. In 1889 we imported 128,683,245 pounds of wool, costing \$18,696,277, an average of 14.5 cents per pound. The duty upon wools of the first and second classes is ten and twelve cents

per pound. All of this wool should be grown in this country, and the money paid for it given to our farmers. We see from this that the principal articles of which we are producing too little in this country are horses, hay, eggs, potatoes and wool. The principal items of our exports which run up to the millions of dollars worth are cattle, corn, wheat, apples, butter, cheese, beef and pork products, as the following table will show;

Live cattle,	329,271,	\$25,673,366,	average price, \$77	00
Corn,	81,278,006 bushels,	35,962,350,	"	44
Wheat,	45,610,978 bushels,	38,506,671,	"	84
Wheat flour,	10,450,757 bushels,	50,240,470,	"	5 00
Apples (green),	656,994 barrels,	1,656,747,	"	2 50
Apples (dried),	22,282,258 pounds,	1,101,991,	"	5
Butter,	25,983,054 pounds,	3,961,522,	"	15
Cheese,	93,940,032 pounds,	8,482,407,	"	9
Oleomargarine,	2,119,209 pounds,	241,581,	"	11
Oleomargarine oil,	42,224,223 pounds,	3,970,094,	"	9
Beef products, including fresh, canned and salted	beef and tallow, 415,315,286			
pounds, \$27,628,589, average price,				65
Pork products, including bacon, hams, salted pork and lard,	1,002,782,059			
pounds, \$79,731,401, average price,				7 75
The total value of all our exports for 1889, was	\$814,287,966			
Of this the agricultural products were	599,507,055			
Leaving a balance of	\$214,780,901			
As the exports of our mines, forests, fisheries and manufactures.				

There is a rather strange anomaly connected with the manufacture and exportation of butter, to which I must call attention. The tables show that we are annually exporting large quantities of butter—last year over twenty-five millions of pounds—bringing nearly four millions of dollars at the very low price of fifteen cents a pound. And yet at the same time I have shown in another paper, on a former occasion, we are not making enough to supply our own population with an amount that they ought to consume. The only explanation which can be given to this is that a very large proportion of our people cannot be eating butter. There is certainly room here, not only for a large increase in the production of butter, but also in the consumption of it. In this case the demand is at fault. Seven hundred and seventy-seven millions pounds of butter were made in the United States in 1879—being only fifteen pounds a year, or less than half a pound a week for each person, and yet twenty-five millions pounds exported. It cannot be the price that is in the way, for the exported price was but fifteen cents per pound. We ought to be able to increase the annual consumption of butter in this country for 65,000,000 of people to at least, 1,690,000,000 of pounds, or double the present amount, and this amount would only allow half a pound a week, or twenty-six pounds a year for each person. We certainly should have no butter for export at any such prices.

We are told that the best way to increase the consumption of butter is to lessen the price. In order to do this the cost of production must be made less, they tell us. But when so large a proportion of it cannot be sold at home for fifteen cents a pound it may be well for us to enquire if there are not other causes operating to produce this low price. Perhaps the quality of the product has something to do with it. If we would elevate the standard of quality the price would doubtless rise in proportion, until a fair price could be realized.

What are the objections to farmers organizations? The politicians have become alarmed at the prospect, and are now loudest in their pro-

fessions of regard for the interests of the farmers. Some of our city newspapers have sent out their reporters to various parts of the state to ascertain, if possible, the strength of the farmers' movements towards organization. I was struck with one of the replies received and published. It came from Lancaster county, and was in effect as follows: "We have no farmers' organizations. The idea is absurd and impossible. Farmers would sooner cut each other's throats than unite to help each other." This statement is entirely the reverse of my experience. I have travelled among our farmers quite extensively, and never yet saw the sign "no admittance" placed over their doorways, or places of business. On the contrary, I have found them the most willing to show what they have, and are doing, and most willing to explain their methods and tell all they know about the business, than any other class. It may be true that they will sometimes undersell, or "cut prices" as it is termed, but this is a complaint that is made by men engaged in all branches of trade, and is no more justly chargeable against the farmers than against any other class. Having so long been used to taking the highest price offered, it will require time to educate them all up to the true idea of setting their own price upon the products of their labor, and to insisting upon getting it. This will necessarily be a work of some time, and the organization of farmers will be one of the most effectual means for its accomplishment.

What do we desire to accomplish by farmers' organizations? I have stated in the outset of this paper that this object was two-fold, mutual improvement and mutual protection. Now that all other avocations have their organizations, the organization of farmers becomes a matter of necessity for self-protection and self-preservation. What do we ask for?

We desire to secure better and paying prices for our products.

We desire to pay no more than our just proportion of the public burdens—taxes.

We desire to have our just share of representation in the halls of legislation.

We desire to be treated justly and fairly by all railroads and other carriers.

These are some of the things we ask for and think we should have. I will say a few words upon each, and first upon securing better prices for the products of the farm; and will put them in the negative form by saying what we *do not* want:

1. We do not want to sell our corn at forty-four cents per bushel in foreign markets, when it is worth more than that to feed at home

2. We do not want to sell our wheat at eighty-four cents a bushel when it costs one dollar per bushel to produce it.

3. We do not want to sell our butter at fifteen cents a pound abroad when we are not making enough for our people at home.

4. We do not want to sell our beef products at six and one-half cents a pound, and our pork at seven and three-fourth cents, when the butchers who retail them here receive more than double those prices.

5. We do not want our dairy products adulterated and counterfeited and sold by falsehood and misrepresentation as *our* goods.

6. We do not want to pay nine mills on the dollar in taxes upon our land, our horses and our cattle, while personal property, in the shape of bonds and mortgages, and railroad and other corporations, pay but three mills.

7. We do not want to pay tax upon our indebtedness in the shape of

bonds and mortgages upon our farms, while bank and railway corporations have their indebtedness deducted.

8. We do not want to have our representation in congress, consisting of twenty-eight members, to have fifteen of them lawyers, and the balance composed of men of other professions, with not a farmer among them. On the contrary we should have as many as our numerical strength entitles us to, which is at least one-fourth of the number, or seven out of the twenty-eight representatives.

9. We do not want the railroad companies to charge us as much for carrying our produce one hundred miles to market as they charge other farmers to haul their produce one thousand miles.

10. We do not want the profits on the short haul to pay the losses upon the long haul.

11. We do not want protection in the shape of duties upon imports on the products of our farms, unless it be high enough to prohibit the importation of the article upon which it is laid, while we have to pay the high prices of those things we do not produce and have to purchase.

12. We do not want to sell our produce at low prices, and pay high prices for the articles we have to buy. If we can receive good prices, we can pay them, but if we must sell at low prices, we must be able to purchase in the same proportion, or do without.

13. We do not want protection that does not protect. All we ask is justice, and to secure this it is now necessary for us to organize for mutual protection.

I will close this paper by restating its vital principle: The time has come, when agriculturists must establish their own prices; to do this they must control production. They must ascertain the extent of demand, and regulate the amount of supply. This world is not so large nor are our lives so short, that the food supply cannot be regulated and controlled as well as can the supply of manufactured products.

THE CAUSES OF THE LOW PRICES OF AGRICULTURAL PRODUCTS.

By HON. ALFRED J. PATTERSON, *Mifflintown, Pa.*

During the last summer I read in one of the leading journals of the day, an article entitled "Rural Decay in New England," in which the writer asserted that farms containing from one hundred and fifty to two hundred acres, fair land, with convenient and comfortable buildings could be purchased for from three to four dollars per acre, and that purchasers were difficult to obtain at these rates, and also that large quantities of land in Vermont, New Hampshire, and Connecticut were relapsing into the primeval state; that very considerable amounts of it were growing up into woodland, and that agricultural products and industries in those state were admittedly and to a marked degree upon the wane. The article made a proof and impression upon my mind. A few weeks after I visited and spent a week in the city of Washington, in attendance upon the great conclave of Knights Templar. Upon an excursion down the Potomac to Mount Vernon, I met a number of very intelligent gentlemen from New England, and I mentioned the

matter to them and they informed me that the condition referred to in the journal was true, and that in a short time very considerable portions of New England would be covered with fruit.

But if we investigate and reflect we will discover that this unfortunate condition of affairs is not confined to New England.

The land of the Middle States, our own commonwealth, its large and rich counties, and our own county, have all felt the effects of some influence which is to an alarming degree driving down the value of our real estate. It seems to me from all that I can learn, from the result of careful investigation, that real estate was never so low in price as at the present time.

Now there must be a cause for this, we think that farming operations are conducted more intelligently than in former years. More care is manifested to save the land from exhaustion, and fertilizers of purity and richness have been advantageously used and the farmer has given more thought and reflection to his avocation in the later years.

But manifestly the business has proven unremunerative and comparatively unprofitable, and hence the low price of our lands, and thus the question which is our topic: "What are the Causes of the Low Prices for Farm Products?" is now demanding solution.

There are two names which are familiar to all in this audience. Astor and Vanderbilt, and it has been said that the financial ability of the latter amounted to genius.

Vanderbilt divided mankind into two classes, those who could, and those who could not, make money, and the latter he said were blank fools. At sixteen he bought a boat to carry farm products to the New York markets. At twenty he built the first steamboat to run between New York and New Brunswick and received \$1,000 a year as captain. He continued on the line until he made its revenue \$40,000 a year. For fifty-four years he followed the water, running steamboats on the Delaware, the Hudson, and Long Island Sound, and steamships on the Atlantic and Pacific. At seventy, with property estimated at \$40,000,000, he directed his attention to and concentrated all his interests in railways. To make such a change in his business at that advanced age was risky and extremely hazardous, but, with his financial capacity and foresight, which we have said was genius, he saw that transportation by railway was the question of the day, and that in its careful handling were untold millions of wealth. From whence came the millions which are in the coffers of Gould and Huntington, and the many millionaires of this great land.

We answer from the railways of the country. Extortionate charges for transportation, unjust discrimination have made the owners of these railroads rich and powerful. Every great fortune almost in this land has been made in and through the handling of railroads and their power is almost unlimited. They control the great legislative bodies, and it is said that their influence has reached the courts and affected their decisions. I have spoken of Vanderbilt and other millionaires, and their method of acquiring wealth, for the purpose of showing its influence as a factor in affecting the price of farm products.

Our county is covered with a network of railways and the products of the rich grain fields of the west are brought to the eastern states and the coasts of the Atlantic.

The great area of these wheat fields, the prolific character of their yield, and the excellent facilities for transportation, have all had their effect upon the price of grains.

In France, at the present time, their lives a man, Count De Lesseps whose dream was the building of a ship canal from Port Said to Suez, and thus avoid the long voyage around by the Cape of Good Hope. It was his dream by night and his thought by day, and after many difficulties the work was completed, in the fall of 1869, and the canal thrown open for the trade of the world.

This brought Europe, with its dense population, in close proximity with countries in which the raising of cereals has been successfully introduced. Before this canal had been constructed and opened, India was not selling any wheat in Europe. Four years after its construction India shipped of grain to Great Britain about a half million of bushels, and two years later she shipped to the same place nearly 40,000,000 bushels, and the amount has kept increasing.

Romania, the Argentine Republic New Zealand all became exporter. A few years ago the secretary of the State Board of Agriculture said "Our prices and the future of our wheat grown depends upon the foreign demand for our nation's surplus. For the past five years the foreign demand for our grain has fallen off to such an extent as to reduce prices to even less than the estimated cost of production, and we do not see the end of the reaction.

* * * In the foreign grain market we now have two competitors where influence was scarcely felt five years ago, but which exert an influence on the prices of the world which forces itself upon our notice. Four years ago Russia furnished Great Britain with but 6,000,000 bushels of wheat. * * India now produces ten bushels where she, five years ago, produced one, and the English government is building railroads for the purpose of bringing the crop cheaply to tidewater.

Australia has in the same time rather more than doubled her average annual crop and depends largely upon European markets.

The lands of India, Russia, Romania, Chili, the Argentine Republic, New Zealand and Australia are all so extremely fertile, the price of labor marvelously low, the cost of living trifling, transportation so cheap that the time will soon be at hand when they will ship wheat to the United States and sell it cheaper than we can raise it, notwithstanding the protective duty. Now we may add that the English nation are supplying the people of India with agricultural implements and machinery, with improved grains, and also teaching them the art and trade of agriculture.

If we contrast the method of transportation over our great bodies of water, and great railroads, with the capacity to move such vast amounts at such marvelously cheap rates and with such great rapidity, with the pack horse and the Conestoga wagon, we see what changes have necessarily taken place in the costs of transportation, and thus see the change in a measure resulting from this factor of transportation.

But their is another view. The farmer is obliged to sell his surplus abroad. This surplus is the profit upon which we as a nation have prospered. Our vast agricultural surplus is produced here, which it is clear to all, cannot be consumed here. We must export \$100,000,000 worth, speaking in round numbers, more than can be consumed at home. This must be sold abroad, when the farmer boards the vessel and sails from New York, he bids good-bye to our government and its laws.

When he trusts his craft and its freight to the winds and waves of the ocean, he is subject to the principles of international law, which are settled by the great principles of human right.

In this way this immense surplus of American produce reaches Liver-

pool, the great English market, the wheat market of the world, and in that market it must be sold, not under a law enacted by the Congress of the United States, but subject to the great law of supply and demand. The world is there to sell and buy. The Russian, the Indian, the Romanian, the New Zealander, the Chilian, the South American, the Egyptain, the German, the Canadian and the American are there with their wheat, come in open competition.

And at Liverpool the price of wheat is fixed, every morning for Chicago, for St. Louis, for Buffalo, for Toledo, and the great grain markets of this country. The grain merchants have their communications with Liverpool, and before the grain market opens, in the morning, the Liverpool price is known, and that price determines the price at which every bushel of wheat is bought or sold that day in the United States. I am not speaking as a partisian or politician, but as an American citizen discussing a question of economics—and am stating what I know to be facts. We must conceive that the question of protective tariff has a marked influence upon the sale of our surplus abroad.

Why is it that we have no market in Canada? Why simply because Canada imposes a duty of twenty-five cents a bushel on all grain sent there. This is in retaliation. I am informed that in France the duty upon American grain has been made so high that it is practically prohibited; and since January, 1888, in Denmark, Norway and Sweeden, a high rate of duty has been imposed, making its importation into those countries almost impossible, and we are practically excluded from Germany, Spain, Portugal, Mexico and South America.

Some one may ask the reason. Sir John A. McDonald, the leading statesman of Canada, explained the matter. When Mr. Butterworth of Ohio proposed reciprocity, Sir John said "no; we have tried it, but the United States Government has always refused it. It has its tariff against us, and we will retain ours against it." Hence our markets are limited and embarassed, and this constitutes another reason for the low price of farm products. There is another fact in connection with the price of farm products which must be taken into consideration and that is that a vast tide of foreign immigration is drifting to our shores, have passed westward, have become purchasers of our rich acres and, instead of being consumers of our cereals, having become producers, and have thus become factors in producing the present low prices.

This condition of things will certainly exist for some time, but eventually there will be a change. It may not occur for years, but it will come it is as certain as night follows the day. An unfailing criterion for the future is the past, and relying upon this rule, the time will come, when the rich praries of the west will be filled with a teeming population, when towns and cities will arise, and that there will be exhaustion of the soil. Just as there is to-day in Ohio, Indiana, Illinois, Iowa and other states. The average yield will fall off, and the population will increase. Great changes are in store for us. The sterile hills of New England will be abandoned, the immigration from the old world will continue, will increase, the center of population will pass westward to a locality which will also be much more of the surplus than at present.

In my opinion the most dangerous competitor we have to encounter to-day in the great wheat market of the world is India. Her lands are marvelously fertile, her climate is mild. Land and labor are cheap. Up to this time she has suffered some from the lack of ability and means to transport her crops to the seaboard. But English capital and English

enterprise is removing this difficulty. The facilities to transport this grain will be furnished, and England, and much of the old world will be independent of the new world for grain.

But we must meet this condition of things with a bold front for the present. The Suez canal is improving with each year. English capital and enterprise is belting India with great railroad lines, the Russian government is expending liberally of her resources to promote facilities of manufacture. Thousands of industrious and frugal Scandinavian husbandmen are crossing the ocean to the new world, setting upon its lands and making it yield rich results. We cannot escape the gravity of this issue. It is upon us, and we must meet it.

But let us view this question from another standpoint. Why is it that we have such low prices in Juniata county, for wheat, oats and potatoes; I will take two years, to wit, 1886 and 1889, and compare the prices in Juniata with those existing for those years in other counties.

In 1888, the price of wheat in June was seventy-five cents in Cameron Fulton and Juniata; in all the other counties of the state ranging from eighty-two cents to one dollar—and in almost all cases two cents per bushel higher. In Perry county it was eighty-four cents, in Mifflin county eighty-five cents per bushel. In that same year, potatoes were twenty-five cents per bushel in Fulton and Juniata and in the other counties of the state ranging from forty cents up to seventy-five cents.

In Mifflin and Perry counties the price was forty cents. Sometime in September, I think, this fall I was in Newport, Perry county, and I had some business with the leading grain dealers, and upon that day I asked them the price of new wheat fair in quality, and they answered from eighty-five to eighty-seven cents. I took a train and came to our county at noon. I then asked a prominent grain dealer what wheat of fair quality was worth, and he answered me seventy-five cents—I understood the Mifflin county price was about the same then as the Perry county price. Why is this? I leave the question with you as food for thought.

Now the prices which are paid for farm products are too low, they are utterly unremunerative, and the question arises what shall we do?

I have given the matter of peach culture some thought and reflection. There will not be a bonanza in it. It will have its drawback. The rigor of our winters, the heat of our summers, the chilling frosts of our early spring time, the drowning rain at the blooming time, the yellows, the bosses, and bad weather for harvesting the crops, will all be sources of disappointment, but our soil seems most admirably adapted, and our fruit is not only beautiful but rich and luscious. On our hills, in our valleys at the base of either of our mountains they will grow and ripen; my grandfather, sixty years or more ago, planted some fifteen or twenty acres of peach trees at the foot of the Tuscarora, and in my boyhood days, we hauled the peaches away by the wagon load, and a very few years ago, I saw some of the old peach trees with fruit upon them.

This industry has been fully tested and our rich and luscious fruit is in demand.

Mountain peaches—there is richness in the name. The peach fields of Maryland, and New Jersey and Delaware have been farmed to exhaustion, and the industry must seek new fields. During the last summer a distinguished ex-officer in the late war was travelling in the south, and by that great flood which brought such fearful loss of life and property to this commonwealth he was detained and on this occasion his attention was called to certain ones at the place where he

was delayed. He went home to the north, organized a company, and has apparently laid the foundation for a colossal fortune. Men of Juniata if the Suez Canal, the fertile fields of India, with its cheap labor backed with English capital and enterprise, the great railroads of the west, and bad laws, have prostrated the industry upon which your father lived and prospered, and upon which you made handsome incomes in your earlier years, seize this new industry, develop it, and make the hills and valleys of Juniata bloom and blossom as the rose.

TAXATION AS IT AFFECTS THE FARMER.

By Hon. J. B. NILES, *Wellsboro', Pa.*

(An address at the Wellsboro' Meeting.)

It is embarrassing to me at this time, when I know very well that a large portion of this audience are thinking about going home, to attempt to address you. It is also embarrassing to me from another standpoint: I am here at home, among my own neighbors and friends, who see me every day, and it will seem to them like egotism for me to address them on this question, which is attracting the attention of the people all over the country, and especially this commonwealth; but I am on the bills, and while I am not vain enough to expect to say anything that will be very interesting, I hope I may make some suggestions, that I may throw out some hints, which will give the farmers and people of this state opportunity to think upon a subject that is bound in the near future to exceed all economic and political questions.

I have no prepared paper, no written address, but I hope to give some figures which will show to you, and the people generally, the unfairness and inequality of the present tax laws of this great commonwealth. One of the causes that led the colonies up to a separation from the mother country was "taxation without representation," and for the same reasons the complaint is made by our people to-day, and made because of the unequal burdens which are imposed upon them, and the same causes which affect the farmer affect the real estate owner everywhere, whether in town or country. The man who has a little village property is affected just as much by this inequality and unfairness in taxation as the farmer who lives in the valleys and on the hill-sides of this state. I believe that the burdens imposed for the purpose of maintaining this government should be fairly and evenly distributed. I believe that the dollar of the prince is equal to the dollar of the pauper: that every man who has a dollar invested is entitled to the same protection as every other man. I don't care whether it is invested in the bank, railway, town lot, or in the farm, each is protected by the commonwealth, and each should share its equal burdens of the requirements of the government. The great difficulty is, that the Commonwealth of Pennsylvania, with its four million people, is living under the same tax laws that our fathers gave to us. We are wearing the same clothing that we wore when we were children. I think I can demonstrate to you, and by way of parenthesis I might state that I shall not say anything here to-day that I have not said substantially before as a state official, that I will not say anything on the subject of personal property that I have not circulated all over this state in a state paper,

and that the figures I give to you have never been successfully contradicted.

Fellow citizens, I start out with this proposition, first, that the dollar of one man is equal to the dollar of another, and I say another thing, that a dollar in money invested in a mortgage or in a government bond is no more sacred than that which is invested in a farm or in a house and lot—each is protected. The owner of each comes into this court and appears before his honor, the judge, and has his rights adjudicated, if any of his rights are affected; but such has been the machinery of our government, that for the past fifty years a dollar invested in a farm or in a house and lot in this village which does not pay three per cent. on its cost, pays five times as much taxes as a dollar invested in a mortgage, which gives its owner at least five per cent. Now, my fellow citizens, that is not fair, and I have said that to larger audiences in the days gone by than that which is here present. Let me illustrate: Suppose I have five thousand dollars in cash; and you, Mr. Secretary, have another five thousand dollars in cash, I go out and buy a farm for ten thousand dollars, cash is demanded and I borrow your five thousand dollars and buy the farm and receive a deed for it, and give a mortgage upon it for five thousand dollars. Now I have a deed for a farm worth ten thousand dollars and you have a mortgage for five thousand dollars, and we are worth just the same to-day as we were yesterday. I would like to have some one tell me why I should pay all the taxes on that farm, having no deductions for the encumbrance, and why your money should go into the investment and pay nothing; and yet, my fellow citizens, that has been for fifty years the practical operation in this great State of Pennsylvania and it is the practical effect of things to-day. You take our railway corporations: I have one in my mind at this moment which cost \$4,200,000; it has a mortgage encumbrance upon it of \$3,900,000; it has a million dollars of capital stock. As a matter of course the capital stock is wiped out by the mortgage indebtedness, and they return the capital worth \$100,000, so that that plant which cost above four million dollars, by the laws upon subject values its stock at \$100,000, and only pays a mere pittance of three hundred dollars of capital stock tax. There are property owners in this village who pay more in local taxes than this corporation, which pays a fair annual per cent. upon its entire cost. That is the reason why the people are groaning under the burdens of unjust and unequal taxation, and that is the reason why the unrest and discontent exists among the people to-day. (Applause.) As far back as 1844, an act was passed which taxed money at interest. Now at that time there were no great corporate interests in Pennsylvania, but we have been going on from year to year, and the corporate and personal property has wonderfully increased, and yet while it is worth more than the real estate, it does not pay one-fifth of the taxes. That is a problem that the farmers and other real estate owners should meet. It affects the village as well as the farm. It affects one owning a house and lot in this town as it affects you, Mr. Secretary, owning a farm in your beautiful county. This question of exempting property from all local and municipal burdens was felt twenty-five years ago. It was one of the causes that led up to the calling of the constitutional convention in 1873. I had the honor, through the partiality of my neighbors, of being a member of that convention, and through the kindness of Mr. Meredith, I had the honor to be placed on the Committee of Taxation, Revenue and Finance. Corporations in the past had gone to the leg-

to the year 1885. The act of 1844 (except the collateral inheritance tax law) was the oldest revenue act in force. They told us you could not tax moneyed capital, yet the first year under the operations of the act of 1885, which was being enforced in the face of injunction bills all over the state—people don't like to pay taxes, it is not a mission of love, none of us hanker after the thing—and yet the very first year after the act of 1885 went into operation we increased the assessment of money at interest to two hundred and fifty million dollars, increased it from one hundred and forty-five millions to three hundred and ninety-five millions, which shows that it is not any more difficult to assess a mortgage than a mule, and each should bear their fair measure of the burdens of the government. We found there were four or five hundred millions of securities held by the corporations which did not pay the pittance of a three-mill tax. There is one corporation in this state that held and has been holding fifty millions in securities which did not pay any taxes under the three-mill rate, and when we tried to enforce the act of 1885, they said that the word "person" did not apply to a *corporate* person—they said it meant an individual person like you and me. We started twenty suits in Philadelphia against twenty moneyed interests, which held many millions of securities. Judge Mitchell said that the word person in the act of 1885, did not apply to corporations. I was afraid it would not as the law then stood, but we satisfied the people of this state that something ought to be done. We had another bill prepared, and in the session of 1887 it was passed, which, as you all know, was not signed, and it failed to become a law. But in 1889, that was remedied, and the present law taxes corporations the same as individuals on moneyed capital. I see that Mr. Shapley and Mr. Kirkpatrick are trying to make the trust companies pay into the state treasury the amounts that are justly due from them to the state, and if they do pay there will be three or four hundred millions of corporate property and bonded indebtedness that will pay under the act of 1889, that heretofore have never paid a single dollar. Now, my friends, that simply means this: If the act of 1889 is fairly enforced, and I have no doubt but that it will be, because I have the greatest confidence in the gentlemen who fill the position of Governor, Auditor General and State Treasurer, there will be brought into the state revenue laws several hundred million dollars' worth of property that was not taxed prior to that time. That will bring you something to help build your roads. Now, for instance, suppose you hold a bond of the Pine Creek railway, you would pay a three-mill tax; but if that bond was held by a corporation it would not have paid a farthing, and that corporation might hold millions of bonds against that railroad company—but being a corporation they did not pay anything. The act of 1889 does, because it holds and makes a corporation pay the same as an individual. This act of 1889 goes a long way towards making personal property contribute its fair share towards sustaining the burdens of the government. Not desiring to weary you, I will not discuss any further the subject of personal property, though much more could be said upon it.

No man has taken the position, as far as I know, that I am about to take before you to-day; but I hope to satisfy you if you stay here a little while longer, that it is a position easily to be maintained. You may have a tax on all your mortgages and on every note and bond which is held by every individual in the state, and you will never get substantial relief unless you go further. Under the act of 1889, which

grew up and was developed from the act of 1885, I believe more than eight hundred million dollars will be taxed than was previous to that time. We increased it to two hundred and fifty million the first year from moneys at interest, and now they have not reached the bonds and mortgages owned by corporations. They are just trying the cases, but you have to go beyond that, because, as said by one of the gentlemen yesterday, the taxes on his farm during the last forty years have increased four hundred per cent. I met a gentleman the other day who owned a farm in Chatham township, who said his taxes have increased until they amounted to more than his payments were when he was paying for his farm. As shown by the Secretary of Internal Affairs, there are in Pennsylvania 10,820 miles of railroad which cost \$1,068,035,566.47. Now if that billion of money is not taxed just the same as your money is taxed, invested in any kind of property, it is not fair and just that it is not so taxed. That is the reason that the things are so tangled and out of tune. When the present tax laws were made there were only a few hundred miles of railroad in the state, and yet to-day the railroads of Pennsylvania are earning nearly as much net profits to the owners as the farms of Pennsylvania. Now what do they pay for the right of eminent domain and the protection they enjoy under the laws of the state? The average mill rate is seventeen mills; it is fifteen mills some places and higher at others; it is twenty in this village, it is more than fifteen in the county taken as a whole. Now if it paid fifteen mills upon the dollar it would pay a county and municipal tax of fifteen million a year. Suppose for instance, that real estate is not assessed at its cost, say at two-thirds of its value, and apply that same rule to railroads on what they return in this report as cost, then the railroads in Pennsylvania would pay millions of dollars into the various local municipal treasuries and state treasury and then you would have money to build your roads and help educate your children. I went over the Auditor General's report of 1889, which I hold in my hands. I have gone over this report as accurately and thoroughly as I was able, and I find that this thousand millions of railroad property in Pennsylvania, last year paid a capital stock tax of \$805,000, and tax on gross receipts \$387,000, so that the entire taxes, so far as I am able to find, that were paid by the railway corporations of Pennsylvania which cost \$1,068,035,566.47 were \$1,230,806, or a little over one and two-tenths mills upon the amount that they return in this book as cost (Report of Secretary of Internal Affairs). Is it any wonder that the farmers are at unrest; that the farmers of the east are suffering under the depression in their avocations? When a thousand millions of property in this state so nearly escapes taxation, is it any wonder that farmers gather here and talk about taxation and the depression of the agricultural interests? Then another thing which has gone against the people of this state. We have a tax that brought a large amount of money into the state treasury, and that was the gross receipts tax. We have an act of assembly by which the railroad corporations paid eight-tenths of one per cent. upon the gross earnings of their railways into the state treasury, but the Supreme Court of the United States have said that we had no right to impose any tax upon any of the dressed beef and other commodities that were shipped from Chicago to the seaboard, and the Pennsylvania railroads have no right to pay it: therefore all the traffic which comes into the state from without or from within is exempt from these taxes. In 1886, the last year I was Auditor General, we received from gross receipts \$1,210,000 in 1889, we only received \$517,256, or a loss of nearly \$700,000—

\$693,000, that is what we lost by one decision of the Supreme Court of the United States. Our Supreme Court said we had the right to collect it, but under this question of interstate commerce we are not able to do it. If it had not been for that, I might not have made this speech; but when I see the most effective tax law that made the Pennsylvania railroads pay swept away by the Supreme Court, I say that it is time to say something, and it is time for the farmers to do something when it sweeps away more than a half a million dollars annually. The Reading and Pennsylvania railroads alone paid \$475,000 less in 1889 than in 1886, by reason of taking away the gross receipts tax, but this decision of the Supreme Court knocked us out. My fellow citizens, I would have the railroads of Pennsylvania pay the same as individuals. I will give you the reason. I would apply the same rule to a railroad that I would apply to farm—no harsher, no other, because as I have said I have no bad feeling against any railroad, no person nor any institution in this state, because I have been treated fairly by all. When I was asked to address you I appreciated the fact that I was also to look into the faces of my neighbors and talk to them and to you about taxation and the ways and means to lessen their burdens and your burdens. Now, my fellow-citizens, I am going to speak with reference to our own county: We have in my own county, and we are proud of the hemlocks, the pines and hills up here; we think we have a good county—we have one hundred and eighty-nine miles of railroad in this county, which runs by schedule time. You, Mr. Chairman, saw the gorge in the mountain, and you wondered where the sixty thousand people live that we are said to have within our borders, but we live; and this one hundred and eighty-nine miles of railroad cost \$6,230,000, and these roads that we have in this county pay into the state treasury \$11,128 which is less than two mills upon what these roads cost.

Now, my friends, any of you would be glad to have your farms assessed at even two mills, or four or five times two mills; and yet that is what six million of corporate property pays into the state treasury and not one cent for local purposes. They have the benefit of this Court house to adjudicate their grievances the same as you, and should they not bear their fair share of the burdens? A county poor house is built just out of town and they have their indigent and helpless with us, and yet here are six millions of property running up and down the beautiful valley of this county which don't pay a cent into the local or municipal treasuries and pay only the more pittance of \$11,128 into the state treasury. That rule applies to every county of this commonwealth, from Lake Erie to the Delaware.

I will give you an instance: We have here, and it is a pride to us, a railroad, and I will give an example by means of it to show you where the unfairness with reference to this capital stock tax comes in. It is a road for which I have always had the warmest feelings. I don't find any fault with any of the railroads; they simply take the law as they find it and pay the taxes in accordance with the laws of the commonwealth, and if the people do not see fit to bring them within the same rule that other people are brought you are to blame, not they. I am not criticizing them; I am simply showing you the unfairness of the laws that have been enacted, and which were made for babes and sucklings. It shows that a capital stock tax does not fairly measure the value of corporate property. The Pine Creek railroad running from Stokesdale to Newberry Junction is seventy-four miles and cost \$4,634,000. This railway which cost four and a half million dollars is

burdened with a mortgage indebtedness of thirty-nine hundred dollars. The capital stock is returned at one hundred thousand dollars in value; the railroad officials have made a fair return, and no one would give more than that for it, burdened with such an indebtedness. They appraised the value of the capital stock of \$1,000,000 at one hundred thousand dollars, and upon it they pay a three-mill tax of three hundred dollars, and that is all this railroad pays running from here to Lycoming county, and yet this bank between here and the Coles House pays six hundred dollars. There are individuals in this village that pay more local taxes in the borough of Wellsboro' than this railroad pays into the state treasury. Is that fair? The real estate in the county of Tioga is valued for taxation at \$16,592,000. It was raised from nine millions in 1886, to that which I now give you. This little borough was increased from six hundred thousand to nine hundred and eighteen thousand. What does the real estate in this county pay in taxes? I took occasion to run through the different townships at the commissioners' office, and they run from ten and one-half in Charlestown, eleven and one-half in Sullivan, to twenty in Blossburg and twenty-three in Shippen,—take the average, and it is about fifteen mills, and the real estate of this county pays two hundred and forty thousand dollars a year in municipal and local taxes, while this railroad, that cost four million dollars and over, with its seventy miles of railroad, pays three hundred dollars into the state treasury. Suppose the railroads paid the same as real estate, suppose they paid fifteen mills on their six million dollars, they would pay ninety thousand dollars, and they would give us back eighty thousand dollars to help build the roads and sustain our local burdens. But suppose they say that our real estate is only assessed at two-thirds of its value, then suppose we say we will assess the railroads at two-thirds of their value and call them four millions, and fifteen mills on four millions would be sixty thousand dollars, and then we would have fifty thousand in county taxes and to help maintain our poor.

The Reading railroad cost \$96,097,057.38. In 1889 it paid a capital stock tax of \$58,431.72 which is only three mills on \$19,477,240—or but a little over one-half mill of its cost.

Is there any man in the world who can say that that is unfair? Now, I have showed you that the real estate in this county pays two hundred and forty thousand dollars a year, and when you are going down to your beautiful homes in Chester county, and are going through this gorge, just imagine where the people get two hundred and forty thousand dollars with which to pay that amount of taxation, and with that question take into consideration that that railroad pays the munificent sum of three hundred dollars into the state government to help bear the burdens. Instead of our paying two hundred and forty thousand dollars we would pay thirty thousand dollars a year, because the real estate of this county is only assessed at three times the value of the railroad—we would pay thirty thousand dollars instead of two hundred and forty thousand if farms and railroads were assessed alike, or, in other words, two hundred and ten thousand dollars less than we are paying now. Almost any farmer or any fellow who owns a house and lot could stand that. You are talking about your state roads and I have been very much interested in your discussions. Now if the railroads of this state did what they do in New York state—and to satisfy you that I am not a crank on this subject I will show you how they do when they get out of this state—if all the railroads paid the same tax

that they pay over in New York, it would be sufficient to pay for the repair of every road in the commonwealth, because if they are worth a thousand millions and pay fifteen mills tax on two-thirds of their value it would give us ten millions, and that ten millions is more than the entire receipts of the state government from all sources. Now the entire receipts from all sources, less the payment of the Allegheny Valley bonds and the commutation of a tonnage tax, leaving out these bonds that the Pennsylvania railroad is paying for the purchase of the old public works, the entire amount of the taxes last year in this state from all sources—corporations, banks, selling whisky and merchandise—was only \$8,465,000, and that includes all the taxes upon the ten thousand stores in Pennsylvania and includes the taxes on every saloon from east to west; it includes every bank and trust company, and yet it is only eight million dollars. I am glad that we have railroads, but that is no reason why they should escape the burdens of the government. These are the figures, and I should be very glad to show them to anybody. Now, my fellow-citizens, somebody will say that is not fair; that can't hold water; Niles is talking about something that he don't know anything about; but, gentlemen, here are the facts, and that is the reason I brought up these books. I did not want to make a speech, and especially at the close of the meeting; but I wanted to show you that what I am talking about is the law of other states, and that these railroads which have their heads in New York and their tails in Pennsylvania should be assessed and pay their taxes in this state just as the farms pay them along through which they run. I am not quarreling with the railroads here, but I do say that one man in this country is just as good as another, and that one man's dollar is just as good as another man's dollar. Henry George is one of the single-tax fellows, and that is the way they are bringing it down on real estate; he says there should be only one tax, and that applied to the real estate, because when you put it on the real estate it can't get away; and that applies to city as well as to rural property, which pays five times and six times as much as does other property. To show you that what I am talking about is correct, I sent over and hold here in my hand the report of the proceedings of the board of supervisors of Steuben county, New York, for the year 1889, showing how they do business over there. I am going to show you this for this reason that somebody might say that this is all imagination. The Corning, Cowanesque and Antrim railroad leaves our state at Lawrenceville, it runs seven miles on down the Tioga river, and it pays a local tax in Smedley of \$1,691.81; in Erwin of \$895.16; in Corning of \$1,552.62—or, in other words, this railroad that runs to Corning, a distance of fifteen miles, pays a local tax of \$4,137.59. This little narrow gauge railroad that runs over to Garner pays a local tax in one township of three hundred and fifty-six dollars, more local tax than it pays state tax into the state treasury because this road pays sixty-five dollars into the state treasury. This narrow gauge road runs through this county thirty miles, and pays into the state treasury a capital stock tax of \$65.89; and yet it gets over in the State of New York and runs through the township of Tuscarora that my friend says is good for nothing, and pays there a local tax of three hundred and fifty-six dollars; or, in other words, it pays no local tax in this state and the first time it passes through the blue sky of the imaginary line, and is in New York, it pays about five times as much in one township as it does in one county here running thirty miles through it. What would I do? I would apply the same rule to them

here that is applied to them over there. You take the State Line railroad that runs down through Southport, that is assessed at \$65,000, and at fifteen mills would make about one thousand dollars of local taxes for running through the village of Southport—that is the way they do in New York. The Erie railway passing through Steuben county pays \$15,584; the Lackawanna pays \$8,000; the Lackawanna and Erie in Erwin and Corning pays an even \$8,000 of local taxes. Just think of it, from two railroads they receive this generous sum to keep up their schools and maintain the railroad employes when they are placed in the county institutions. Is not that something like fairness and equality?

They go further than that; I want to show what the railroad companies in Steuben county pay. In New York they even tax the telephone poles, the telegraph poles and the pipe lines, and they are assessed as real estate. In the county of Steuben last year these various corporations were assessed at \$4,044,766, and paid a local tax of \$37,937.37. Suppose when we were flooded here last year they had been assessed for local purposes at fifteen mills, how would it affect the real estate of Pennsylvania so far as the burdens of taxation are concerned? The question suggests the answer. I would not apply a different rule to a railroad than I would apply to my house and lot in this village. I would not say to Mr. Vanderbilt, to Mr. Gould, or any of the others, that they should pay any more than any one else upon the value of their property. Over here in Chemung county the railroads and other corporations are assessed \$2,650,000, for local purposes. I hold in my hand the proceedings of the board of supervisors for the year 1889. They go so far in the State of New York, and I hold in my hand that which will bear me out in a case reported in the forty-sixth volume of the New York State Reports, as to tax a street railway that is laid upon the road bed of a public road; it was held in that case that under the statutes of New York this street car railway company was taxable for local purposes. When we are surrounded by states receiving this just benefit, is it fair and honest that we have not this same right and that we should not have the same rule applied to them? Isn't it evidence that we are living in children's clothing while in other respects we are in full grown manhood?

I find in fifth Abbott's Digest of New York's cases: "Under the provisions of the revised statutes, companies whose stock or the principal part thereof is invested in the land necessary for their roads, and in their railways and other fixtures connected therewith, are taxable on that portion of their capital as real estate in the several towns or wards in which such real estate is situated, and such estate is to be taxed upon its actual value at the time of the assessment, whether that value is more or less than the original cost thereof. Such companies are not taxable on their capital or personal estate except so much as remains after deducting all their real estate or cost, including the railway itself."

Mohawk & Hudson R. R. Company *v.* Clute, 4 Paige, 384: "The assessors are to estimate and assess that section of a railroad in their town at its full and true value. That is the value of the land and the erections and fixtures thereon, irrespective of the consideration whether the road is well or ill managed, or whether it is profitable to the stockholders or otherwise."

Railroad Co. *v.* Osborn, 12 Barbour, 223: The statute of New York in relation to assessment and taxation provides "that all lands within

the state, whether owned by corporations or by individuals, shall be liable to taxation. The term 'land' shall be construed to include the land itself and all other articles erected upon or affixed to the same, and the terms 'real estate' and 'real property' shall be construed as having the same meaning as the term 'land' thus defined."

By force of these provisions the track of the relators, consisting of stringers, ties and rails, affixed to the land is, for the purpose of assessment and taxation, land, real estate, real property, and it is liable to taxation. See opinion of Mr. Justice Folger in *The People v. Cassity*, 46 New York Court of Appeals, page 48.

That is the law in New York, and I have referred to these matters in order to show you how the railroads are taxed after they get out of our state and into another. In New York they pay a capital stock and gross receipt tax which is not so high as ours is here. The railroad which leaves this village and enters New York twenty-four miles north of here is assessed for local purposes at fifteen thousand dollars per mile.

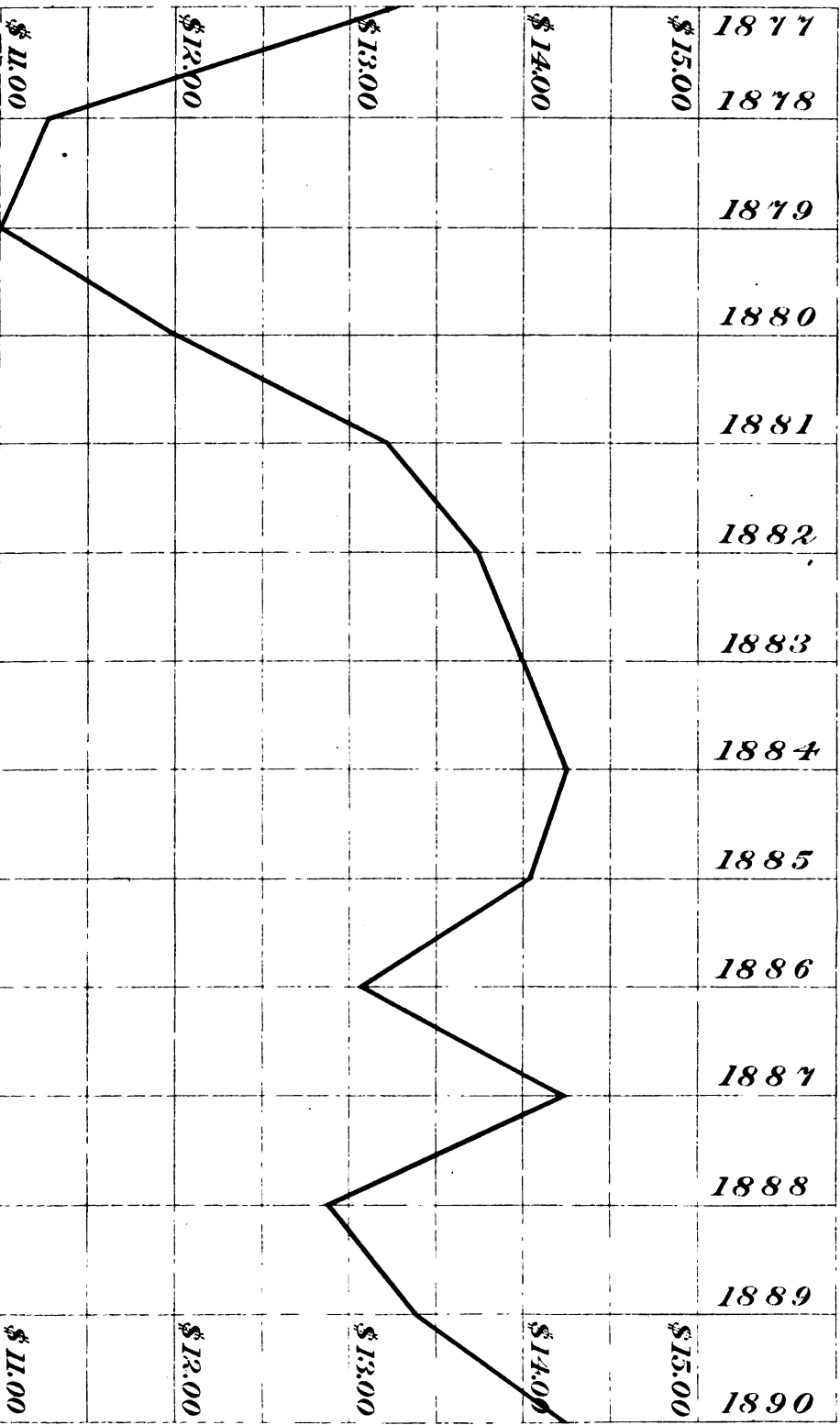
This is the rule in Ohio: "Section 2770.—The county auditors of the several counties in this state, in which any railroad company now has or hereafter may have its track and road-way or any part thereof, shall constitute a board of appraisers and assessors for such railroad company. Any railroad company having its road or any part thereof in one county only, the auditors, of such county shall constitute a board.

Section 2772.—The several county auditors shall meet on the second Tuesday of May in the place where the railroad has its principal office or in the principal city or village upon the line of such road, as the case may be, and proceed to ascertain all the personal property, which shall be held to include the road-bed, water and wood stations and other realty as is necessary to the daily running operations of the road.

Section 2111.—The value of such property, moneys and credits of any railroad company as found and determined by such board shall be apportioned by such board among the several counties through which such road or any part thereof runs, so that to each county and to each village, city, township and district or any part thereof therein shall be apportioned such part thereof as shall equalize the relative value of the real estate, structures and stationary personal property of such company therein in proportion to the the whole value of the real estate, structures and stationary personal property of such railroad company in this state and so that the road-bed, main track, rolling stock, supplies, money and credits of such company shall be apportioned in the same proportion that the length road in said county bears to the entire length thereof in all said counties or county and to each city, village and district or any part thereof therein.

So far as I have been able to see, the state that comes the nearest to what ought to be done in our state is the State of Illinois, and I refer them to the revised statutes of Illinois, page 998; and if your legislature next winter would take the two sections that I am reading from and put them into a law, you would receive several millions more next year than you are now receiving.

Section 41. (Such right of way, including the superstructures of main, side, second track and turnouts) and the station and improvements of the railroad company on such right of way, shall be held to be real estate for the purpose of taxation and denominated "railroad track" and shall be so listed and valued and shall be described in the assessment thereof as a strip of land extending on each side of such



VARIATION IN FARM WAGES FOR FOURTEEN YEARS-1877 TO 1890
 FOR THE WHOLE YEAR WITH BOARD.



railroad track and embracing the same, together with all the stations and improvements thereon, commencing at a point where said railroad track crosses the boundary line in entering this county, city, town or village and extending to a point where each track crosses the boundary line leaving such county, city, town or village or to the point of termination in the same as the case may be, containing — acres more or less and when advertised or sold for taxes no other description shall be necessary.

Section 43. The value of the "railroad track" shall be listed and taxed in the several counties, towns, villages, districts and cities in the proportion that the length of the main track in such city, county, town, village or district bears to the whole length of the road in this state, except the value of the side or second track and all turnouts, and all station houses, depots, machine shops and other buildings belonging to the road which shall be taxed in the county, town village, district or city in which the same are located.

Railway Company *v.* Paddock, 75 Illinois, page 616.

Illinois Revised Statutes, page 999.

Now, if that was the law in Tioga county we would receive fifty or sixty thousand dollars more than we are receiving. If that was the law in Pennsylvania, the sixty-seven counties in this state would receive several millions more than we are receiving. We would be extending to these industries the same treatment that they are receiving all over this great country. You apply the same measure of taxation to the thousand millions invested in railroads in Pennsylvania that is applied to them in the State of Illinois and a great burden would be lifted from the shoulders of my fellow-citizens in the State of Pennsylvania. I know figures are dry; I could have made a more interesting and happy speech if I had taken another subject; but I simply desired to take up this subject to show that in my judgment the only way to relieve the over-burdened citizens of Pennsylvania is to carry out the golden rule, that all taxes shall be uniform and be equal within the taxing power of the state.

THE FARMER'S SITUATION, AND SOME OF THE REMEDIES PROPOSED.

By HON. GERRARD C. BROWN, Yorkana, Pa.

The condition of agriculture has become so bad that it attracts the attention of all classes.

The farmers themselves, proverbially the slowest, are becoming alarmed and everywhere manifest an anxiety not unwarranted.

On all sides we behold the depreciation of farm property, a sure test of the unprofitableness of agricultural industry.

The losses to the farmers by the fall in the market value of their farm lands rises up into the hundreds of millions of dollars. In this state alone, between 1870 and 1880, it amounted to \$68,000,000 and there is no question but that the census of 1890 will show a still heavier shrinkage.

From every quarter of the state and especially from the oldest settled and richest agricultural counties comes the same doleful tale.

Berks county reports more sheriff's sales of farm property than in any three previous years. Chester county was reduced once more its assessment by a large amount, and even then fails to materially relieve the pressure on its farmers.

And this depression is not confined to any state or section, although Pennsylvania exhibits perhaps a more rapid shrinkage and a greater proportional percentage of loss than any other state east of the Alleghanies

But in New England it began earlier, has therefore lasted longer, and is more marked in its absolute results. There are almost one thousand deserted and abandoned farms in New Hampshire with habitable houses and buildings (See last report of State Board of Emigration). So bad is the condition of agriculture there that no one seems willing to undertake the cultivation and maintenance of homesteads from which have sprung many of the greatest men the country has known.

State Assessor Wood of New York predicts that "in a few decades there will be few or none but tenant farmers left in the Empire State". New Jersey authorities report plenty of farms for sale at cost of buildings, leaving the land practically free of cost, much cheaper, situation considered, than the dollar and a quarter homestead in the west. The same is true of Maine, Massachusetts, and Connecticut.

Illinois which has an efficient bureau of statistics, shows the mortgage indebtedness of the farmers of that great prairie state to be increasing at the rate of over \$20,000,000 per annum. From the exhibit we learn that already more than one-fourth of her farmers are tenants on the lands they not long since owned. Kansas, Iowa, Nebraska Minnesota all chime in the same sad refrain.

Throughout all the land we see that the farmer's labor is in ruin, inasmuch that he is losing instead of gaining. All the great advances, improvements and inventions of the age he has hastened to adopt as far as is in his power and still he falls behind. Larger and still larger crops mean lower and still lower prices, mean loss instead of gain. He is working himself and perhaps his land to death in many instances and yet the American farmer is growing no crops which increase so fast as the crops of mortgages.

Hence when forced to a sale, and the sales are few now which are not forced, it not unfrequently happens that a judgment which when laid was estimated fairly for one-half the value of the farm, now, with interest and costs, takes the whole and leaves the farmer stripped clean. As these facts are all notorious, and no light appears ahead, is it any wonder that the assignee, or the sheriff, now has a practical monopoly—in selling farms.

It is not worth while, too quote, *in extenso* statistics at hand to prove the depreciation of farm properties. It is entirely unnecessary. Every man who owns a farm, every man who works a farm, here or elsewhere, has had these hard facts burned into him by the bitter experience of the last few years.

The only exception is in the cases of those few fortunate ones whose location enables them to obtain a speculative value for their lands, a value not based on their productive capacity, but upon their availability as building sites.

Never before have the farmers themselves been so agitated, because

never before, not even in the early days during the hard experiences of the settlers, or the throes of devastating warfare have "times been so hard" for them.

No longer is it with the farmer a matter of getting rich or even of making money; it has narrowed down to a struggle for a bare subsistence. No longer can we look forward to a balance saved at the year's end—it is all—too often more than all—that we can do to keep heads above water and make ends meet.

For so marked in general and so disastrous a break down there must be potent causes; to ascertain and remedy which is the most pressing duty which confronts us as farmers and citizens.

And not farmers alone; as every legitimate business interest, every honest employment, is based upon and exists by agriculture, it follows that town as well as county is interested in this enquiry and should coöperate for its solution.

And as now all must acknowledge this decline in agricultural progress and prosperity, so there is an endless variety of notions as to its cause, and of propositions for its cure; which ideas, by the way, are quite apt to be colored by the interests of the individual advisor.

So we find alleged as causes, among others, these

Over production.

Bad farming.

Improvidence and extravagance.

Extortion by pools and trusts.

Gambling in futures, grain produce, etc.

Private ownership of land (the George theory).

Demonitization of silver (inflationist theory).

Railroad discrimination in freights.

Bad roads.

Taxation, direct, unnecessary, unequal and unjust.

Taxation, indirect, protective to other interests.

Life is too short, to exhaustively discuss these different topics in their true bearing on the farmers' Situation; the attempts to do it in the limited time of a farmers' institute could hardly be expected, though probably all of them have some influence in determining the condition as we find it; and naturally so, because the agricultural underlie all other interests, and any important factor affecting them must concern it.

But, as we have seen, this unsatisfactory situation is wide spread, is not confined within any state lines, exists in the boundless western prairie of virgin soils as in the rugged and well-worn hill farms of the east; drives in the same despair the New Englanders from his ancestral home, the Dakota settler from his clearing; wipes out with one fell swoop the cattle raiser, the grain farmer, the dairyman, the orchardist; oppresses as well the proprietor, the tenant, the laborer; it cannot arise from any merely local cause, it must spring from that which is national in its characteristics and influence.

It is agreed that farm produce now averages lower in price than at any time in our knowledge, decidedly lower now, in 1890 with 65,000,000 people, than thirty years ago when we had but 32,000,000.

Can this be laid to over-production. Hardly, for had we the world's market on equal terms, did we not shut ourselves out of it by artificial restrictions on commerce, we would find among it 1,400,000,000 of people customers for all our surplus products. Nor is it bad farming. Our crops average better than in any former period, and by the general use of labor-saving machinery are sooner and better garnered.

But, as it is, they are largely in excess of the power of this people to consume them, and better farming, *i. e.* larger crops, would only mean still lower prices, still heavier losses, unless the existing obstacles to trade are removed.

To charge our farmers with extravagance, with living too well, is invidious. They are to day the hardest worked, the poorest paid of all men. But as a class they cannot vie in dress or appearance with laborers in other industries, with men in other occupations who do not own a title of their property, or perform the fourth part of their labors. It is a fact that in any public gathering the average farmer is the worst dressed man, and among his peers his children are the poorest educated.

Nevertheless he is the producer of all the good things of this life; "he feeds and clothes the world," is he not to have his share? Should not the first fruits of the land be his to enjoy by right? As to the "private ownership of land," it does strike the ordinary man as an extraordinary idea, this scheme to abolish the farmers poverty by relieving him of his property.

It does seem as though the sheriff was already actively engaged in bringing about this sort of a millenium.

Legislation with the avowed purpose of depriving the citizen of his home and fireside, is, in this country at least, fortunately not only impracticable, but impossible.

Then there are those whose argument is, that there is an insufficient amount of the circulating medium, in short not enough money. Let them consider the \$701,000,000 in the United States treasury at the close of 1889, which is a contraction of the currency inevitable where federal taxation absorbs and piles up faster than the legitimate requirements of the government can disburse, and intolerable even if disbursements could be achieved, because of the injustice wrought to the original payers of the needless tax.

Those who claim that unlimited coinage of silver dollars is all that is required to flush the channels of trade, to stimulate prices and restore the pristine prosperity, I would refer to the United States vaults now crowded to bursting with the \$305,000,000 in coin and bullion stored therein; bearing in mind also that since the passage of the Bland bill in 1878 there have been over 360,000,000 silver dollars coined as against 8,045,838 in the eighty-one years which preceded 1873, the year of the suspension of the silver dollar coinage.

Bad roads are a nuisance, an inevitable nuisance, under the miserable laws, or rather apologies for laws, which authorize and control their working in this state. But right here we must make no mistake, we can easily "jump out of the frying pan into the fire." A more disastrous thing to us farmers than bad roads would be better roads which would cost too dear. Whatsoever road system we adopt, it must not be one that will saddle more cash taxes on the townships, for we can't stand it. We can't afford to build roads for our successors, by assignee deed, to travel over. But this is a comparatively local issue in any event, and so is the operation of the unjust and iniquitous system of revenue laws of Pennsylvania, which impose on real estate five times the rate of taxation that it does on corporate and personal property. This may be one cause for the greater comparative decline of farm prosperity in this state, but the scope of our inquiry is general, even as the decadence of family interests is general, all over the country.

Therefore the shameful discrimination which the railroads practice

in this state, and which they are enabled to do with impunity by virtually owning the legislature for many years past, affects the family interests of Pennsylvania most seriously; but it also affects all the business interests of the state. City and country alike are plundered to satisfy the insatiable greed of the little ring of speculators who control our transportation monopolies.

It is evident from even this cursory review of these alleged causes of our depressed situation that we must look yet further for a satisfactory solution.

But we have ascertained that national causes do not allow for it. Once big crops, full barns and granaries meant a prosperity that they do not now confer. We see that other interests, no more important, not so vitally essential as ours, are much more prosperous and we naturally seek to ascertain the means by which they thrive. We know that in fishing, in mining and in manufacturing, they have received certain advantages by law, that they have been protected in a large degree, whenever they asked for it, by a liberal bounty. At first indeed the tariff was enforced as a war measure and generally acquiesced in as a military necessity. As years rolled on it was re-adjusted at the instigation of important interests, and its advocates in order to secure the support of the agricultural in maintaining this system, professed to extend its benefits to the farmers as well. They protected us with a tariff also, at least they pretended to do so. Wheat, oats, corn, cattle, wool, all our principal staple crops were embraced therein. (But how has it resulted. Their price has gone down—down—emulating McGinty, and though on the whole below cost of production we cannot be sure that they have yet touched bottom.) They told us we were trebly protected, first by a tariff on our leading products, second by the home market which would thus be created for us, lastly they engaged through their representatives in Congress that we should be re-imbursed any how, by the cheaper goods which competition so stimulated would furnish to us; thus agreeing not to raise the prices of the same by any combination of makers.

But the home market has proved fallacious we still must find a foreign market for one-fourth of our farm productions, or produce them at a net loss.

And they have in almost every instance by mutual agreement between the various concerns constituting and representing each leading interest, in other words by establishing trusts, succeeded in dictating prices to all consumers, as well as wages to their employes and the price of the raw material they required, thus virtually establishing the rate of profits that they deemed proper.

As protection has proved such a bonanza to them, what more natural than that the farmers finding that after all, they had been outside of the coverlet, should now crowd up asking for protection too, some of the real genuine article.

And that is just what they are now doing. They have been besieging the doors of the Ways and Means committee begging for protection. They are sure they know it when they see it, they can quite readily size up a protection like that which the glass industry is favored with, which running from seventy-eight to one hundred and fifty-two per cent. enables the Pittsburg Plate Glass Company to declare a net dividend of thirty-five per cent. on its capital of \$2,750,000 last year. Like that which enabled the American Flint Glass Association last Monday

week to add ten per cent. more to the price of their wares, making a total advance of forty per cent. in six months.

Considering the fact that the net income of investment in farms does not reach three per cent. "in these degenerate days" and that by no possibility can farmers add ten per cent. or one cent to the selling price of their products, it is not to be wondered at that they are tired of the humbug protection which they have had and now want some of the serious pure article that they see their friends and allies sporting, they who are making iron, steel, chemicals, tools, machinery, crockery, glassware, shoes, hats, clothing, etc., To be sure farmers are not alone in their misery. There are the woolen manufactures; they have an average protection of sixty-seven per cent. on their goods, but they pay more than forty per cent. on the materials they use, and sixty large mills have made assignments within a year throwing several thousand persons out of employment. They need more protection also, but as the wool grower is on the same errand and quite as likely to succeed as they, it is evident that they will be just where they were before, and so they now incline to throw the fleece raiser overboard as no longer of any use to them, in fact to fleece him.

But the farmers who believe in the fetish of protection, who have been supposing all these years that they had it, because they were told that they had, have now become aware, through their nudity, that for some cause or other it does not cover them, and they are requiring it under penalty.

The question is, if they have not had it how are they to get it. Upon what will they ask for a higher tariff, for a rate that will increase the prices of their staple products. What additional tariff for instance could they put upon wheat, the great staple of life, of which we raise more than 100,000,000 bushels annual surplus? What upon corn, the most important of all our crops, which has the greatest acreage, employs the most labor and returns the greatest value? What upon cotton, nearly three-fourths of which finds its best market across the water? What upon meat and provisions, the beef and pork, the cattle and hogs of which we can grow enough to supply half the known world? What on milk, butter and cheese, the value of which double discounts the iron made in the whole country? What on horses and mules, in raising which we surpass any other nation?

These are the great staples which constitute more than nine-tenths of our farm products and which in all events and under all conceivable circumstances must continue to do so. As to the comparatively insignificant portion remaining, some of them, perhaps, might be partially or occasionally increased in value by a higher tariff thereon, but of course at the expense of the consumers of this country, and as the farmers are much the largest class, they are the greatest consumers and would have to foot the greater part of the tax thus laid for the benefit of certain other farmers, with no chance to get anything in return. Cabbage, potatoes, hops, beans and peas would in case of light crop here, bring a better price, but it would only operate in a scarcity, and would in any case only benefit an infinite small part of our people.

How can we then better the condition of farmers in general by placing a higher bounty on the products of a few, when we must be obliged to confess that it could only affect favorably a mere fraction of those engaged in farming.

No remedy is worth considering unless it appears likely to extend its advantages to the majority of the farmers of the United States.

They have not received it through a protective tariff. That has now become evident to even the blindest of them, and it is equally evident that there is no hope of their ever receiving it in the future.

The American farmers then have never been protected in any sense, though at a tremendous sacrifice they have been protecting other interests. I shall not here extend the inquiry as to what this has cost them, pertinent as this inquiry is, but it has been an enormous load, and more than they can bear, as their exhausted condition shows so plainly.

A system that taxes farmers on all that they consume that they do not themselves produce; which compels them to pay a bonus averaging forty-seven per cent. out of a business that don't yield them three per cent. net, is too one-sided, too unjust and too oppressive to last. Call it "protection" if you choose, its result is destruction to our interests. It is a wonder that we have stood under it as long as we have; it will be a miracle if we can endure it much longer. It must go, or we will have to go. Protection to others at our cost is too expensive a luxury for us farmers any longer to indulge in, especially as the circumstances of the case absolutely shut us off from any possible participation in the benefits thereof.

The grim lessons of experience have now thoroughly learned us this: all that we need, is to cast aside party prejudice, open our eyes boldly and unshrinkingly to the facts, and unitedly enter into the fight with the formidable foe to our best interests whom our own negligence has fortified, and secure reasonable reduction of the needless and disastrous tariff tax on the necessities of life.

FARM TAXES AND FARM TAXATION.

By the SECRETARY.

At several of the meetings of the Board, at nearly all of the fifty-six institutes held under the auspices of the Board, and in fact at all of the meetings of farmers held in the state, the subjects of taxes and taxation have been prolific sources of discussion, and various views have been presented and upheld with more or less vigor by their respective friends.

Much as these views may have been found to disagree in minor particulars and in non-essential points, they are all found to agree in one particular, viz, that there exists among farmers a wide-spread and well founded dissatisfaction with the present relative ratio of taxation between real estate and personal property, or, to bring it more nearly to the farmer's stand point, between the taxation of farms and farm property on the one hand and upon corporate and personal property upon the other.

Some of the speakers have gone so far as to ascribe the present depressed condition of agriculture entirely to this inequality in taxation; this view is scarcely tenable when we remember that if all of the taxes upon farms were remitted it would help the farmer but little, and would do but little to restore agriculture to the position which it occupied twenty-five years ago. Our statistics, given in full hereafter, show that

the average amount of taxes levied upon a Pennsylvania farm worth \$10,000 is not more than ninety-five dollars; the entire remission of this amount, while it might partially relieve him, would not restore the calling to the profitable condition of former years.

Reliable figures from our best authorities clearly prove that real estate, as compared with corporate and personal property, is paying a disproportionate share of our taxes; but we think that a careful examination will show that this disproportion has been somewhat magnified by the use of unreliable figures and data.

We also think that it must be admitted that, no matter what modifications (within the limits of the constitution) may be made in our revenue and assessment laws, real estate will always bear an undue and disproportionate share of taxation. This is due to the fact that the real estate is the only species of property upon which it is possible to secure a full and just return and a fair and just valuation. We may enact laws assessing all species of property alike, but where the property can be concealed, a just return cannot and will not be obtained, and this class will always escape a portion of its legitimate share of taxation. Personal and corporate property may be and is concealed but real estate cannot be, and for this reason alone is likely to be compelled to bear a portion of the burden justly due to other species of property. By a systematic change of our assessment laws it is no doubt possible to secure the return of a much larger proportion than at present but we cannot conceive of any statutory provision which can or will make all men honest.

Admitting the existence of an unequal distribution of the burdens of taxation, we still think that the inequality has been made to appear greater than it really is, and this too with honest intention, but by the use of improper data. For instance, some writers have taken the figures representing the value of the real estate of the state from the reports of our Secretary of Internal Affairs, forgetting that these figures represent the assessed and not the real value. Some of our counties assess real estate for purpose of taxation at less than one-third of its real value; some assess it at rather less than half value; none, so far as our examination has extended, assess it at its real value. Taking the above figures as the data upon which to found arguments, it is necessary to add to them from twenty to thirty-three per cent. to obtain the figures representing the real value.

On the other hand, the same persons have taken the figures with which to represent corporate property from the reports of the Auditor General, forgetting that these figures represent the value of corporation stock at par, while in reality a large proportion of them have practically no value at all and others are worth considerable less than par.

We think that a calm and fair investigation will show that, as is often the case when a point is to be proven by extreme figures, the truth is to be found somewhere between the two extremes, and that when carefully prepared figures are taken the discrepancy is not as great as has sometimes been represented, and further that a portion of this discrepancy is due either to the concealment of corporate property or to its exemption from taxation by laws.

In many cases the figures presented are, at least to a certain extent, misleading, because they include property which is exempt from taxation by law; thus for instance there is in out state property of a value, for assessment purposes, amounting to \$200,000,000 which is exempt; if to this we add the usual one-third for the difference between the assess-

ed and real value, we have property to the amount of \$250,000,000 which pays no taxes at all. We have on our farms live stock to the amount and value of \$75,000,000 which is also exempted from taxation by law or by the failure to return it to the assessor. The stock of building associations, valued at \$75,000,000 is also exempt from taxation. Thus by a slight examination we find property to the amount of about \$400,000,000 which is free from taxation. This if taxed to the same degree as real estate, would relieve the latter from taxation to the amount of \$5,750,000, or about one-sixth of the rate which it now pays, and this too without any other change in our laws save those of exemption.

Any system of comparison between taxation of real estate in different localities, which is based upon assessed values is misleading and deceptive, because no two of our counties have the same rate of valuation; thus, for instance when our correspondent in Susquehanna county writes us that "On this farm there was levied this year (1890) a county tax of ten mills, a road tax of ten mills, a special road tax of five mills to pay indebtedness, a contingent road tax of five mills, school tax of nine mills and a poor tax of six mills, making a total taxation for all purposes of forty-five mills," the taxpayer of some of our eastern counties would be startled and inclined to doubt the correctness of the statement; and yet it is established beyond all doubt that some townships are paying a total tax of fifty-five mills upon the assessed value of the real estate within their limits; but when we know that this real estate is assessed at less than one third its real value, much of the surprise at once vanishes, and we have convincing proof of the utter unreliability of all comparisons based upon assessed values. Nor can we assume that the real estate within a township bears the same rate of taxation, even when it is supposed that the same assessment is applied to all. Taking our reports of property in one of our best agricultural counties, representing property in farms only, we find considerable variation in the rate of actual taxation even in the same township.

Acting upon this belief, we have obtained the actual and real values of a large number of farms situated in fifty-two counties of the state; in very many cases these values are the result of sales made within the past eighteen months, and in all cases representing the actual or estimated value of the farm at the time the return was made. In fact a large number of these valuations are the results of sheriff's and private sales within the past eighteen months; we may therefore safely assume that the valuations are under rather than above the real ones. With these valuations we have in each case obtained the total amount of the tax paid.

From this data we find that we have the valuation of farms amounting to \$5,177,101.00 and the farms thus represented are paying taxes at the rate of \$47,540.05 annually.

We also find that in addition to the assessed value of the farm, each tax duplicate carries with it the personal property which is taxed with the farm; the total amount of taxes paid includes this personal property but the valuation of the farms does not include it; this amount of personal property will not vary much (taking the state as a whole) from ten per cent of the value of the farm; in order to obtain the amount of tax actually paid upon the value of the farms we must deduct ten per cent. from the total amount, leaving the sum of \$42,780.55 as the amount of taxes paid on farms valued at \$5,177,101; if we include the personal property with the farm, this will indicate an average tax rate of nine and eighteen-hundredths mills to the dollar of actual value; if

we exclude the personal property and retain the actual value of the farm only, the tax rate is reduced to eight and twenty-six-hundredth mills to the dollar of value.

In this connection it is but fair to remind the reader, who may think the allowance of ten per cent for personal property is too great, that the amount on the duplicate is very far from representing the actual or real value of this personal property; all are aware of the manner in which such valuations are made and know that they do not, on an average, represent more than one-half of the actual value of the live stock and other personal property represented.

As the returns have been received at the office of the Board they were tabulated by counties, and in order to obtain the average mill rate of each county, the total amount of tax returned was divided by the total value of the farms paying the amount of tax, and the result taken as the average rate. The reader will bear in mind the fact that the mill rates given below represent the rate of taxation upon the dollar of actual value, and that they *include* the personal property returned with the farms.

This plan gives us the following results from the counties named:

Northumberland,	5.88 mills.	York,	9.14 mills.
Lehigh,	5.93 "	Adams,	9.16 "
Northampton,	6.27 "	Franklin,	9.19 "
Lancaster,	6.78 "	Delaware,	9.32 "
Cumberland,	6.83 "	Blair,	10.08 "
Union,	7.05 "	Lackawanna,	10.08 "
Centre,	7.18 "	Lawrence,	11.05 "
Crawford,	7.43 "	Juniata,	11.27 "
Montour,	7.40 "	Clearfield,	11.40 "
Beaver,	7.47 "	Tioga,	11.87 "
Columbia,	7.60 "	Fulton,	12.08 "
Bucks,	7.87 "	Elk,	13.40 "
Montgomery,	7.80 "	Clinton,	12.81 "
Mercer,	7.98 "	Indiana,	14.66 "
Armstrong,	8.00 "	Forest,	14.64 "
Berks,	8.06 "	Fayette,	15.00 "
Westmoreland,	8.08 "	Bedford,	15.19 "
Schuylkill,	8.16 "	Venango,	17.20 "
Perry,	8.49 "	Lycoming,	17.65 "
Erle,	8.53 "	Warren,	17.70 "
Chester,	8.54 "	Wayne,	19.00 "
Pike,	9.00 "	Susquehanna,	19.12 "
Washington,	9.00 "	Cameron,	20.32 "

Our returns from the following counties would indicate the tax rates which we have attached to each; but the value of the farms returned is not sufficient to warrant us in giving these rates as exact; they may be more or less influenced by subsequent reports:

Snyder,	8.08 mills.	Clarion,	10.20 mills.
Bradford,	9.88 "	Jefferson,	14.44 "
Wyoming,	10.00 "	Somerset,	17.80 "

In making their reports our correspondents have, in a number of cases, added items of interest to the general reader which we here introduce:

Butler.—Butler county is assessed at fifty-five per cent. of real value. Average mill rate: County, six; road, six; school five, and poor, one and one-half; total tax rate eighteen and one-half mills.

Tioga.—The rate of taxation in our county varies from eleven to nineteen mills, and the assessed value is about eighty per cent. of the actual value.

Montgomery.—Rate last year was county, three; school, two, and road tax three mills; a total of eight mills.

Susquehanna.—There are forty-one boroughs and townships in this county; the levy is from twenty-eight to sixty-nine mills on the dollar of assessed valuation; this includes all local taxes; the highest are where twenty-six mills are levied for school purposes. I have taken the price of eleven pieces of land in eleven different townships, that have been sold, and I estimate that the price sold for indicates fair value and I find that about eighteen mills tax is paid on the actual sale value.

Sullivan.—The assessed value is about one-fourth of the actual value; my farm of eighty acres is assessed at fifteen hundred dollars and the tax is ninety-two dollars.

Wayne.—Eighteen to twenty mills on the real value, or thirty mills on the assessed value, would be about right for the whole county. Would not estimate it at over eighteen mills on the real value. Mill tax on assessed value this year is, county, six mills; school, seven; poor, six; cash road tax, six, and work tax, five mills; a total of thirty mills of assessed value.

Chester.—I think that we are paying an assessed value of about three-quarters to eight-tenths of the real value, beside paying double on mortgages.

Erie.—On these farms there is a levy of two and one-half mills for county, two and one-half for school, two for cash road tax and two for work road tax, total nine mills on assessed value.

Susquehanna.—In some districts of the county where they are building school houses and where a heavy special tax is levied for road and bridges, you could add forty per cent. to the tax stated.

Columbia.—Taxes in 1889 were about eleven and one-half mills on assessed value which is about two-thirds of actual value.

Susquehanna.—Upon this nine hundred dollars of assessed value, which includes the farm which would not sell to-day for more than twenty-five hundred dollars, and stock that would not bring more than two hundred and seventy-five dollars, there was levied this year a county tax of ten mills, a road tax of ten mills, a special road tax of five mills to apply for payment of the indebtedness of the township, a contingent road tax of five mills to pay current expenses, school tax of nine mills (it is usually ten), and a poor tax of six mills, making a total taxation for all purposes of forty-five mills on the assessed value, which in my judgment, is a little more than one-third of the actual value.

Blair.—Most of the above farms are taxed double; the owner of the last mentioned one borrowed five thousand dollars so that the interest in assessed value, instead of being eleven thousand dollars is only six thousand dollars, but he has to pay three hundred dollars interest per annum and the taxes on the whole amount of assessed value.

Fayette.—The best estimate that we can make is for valuation sixty dollars per acre and for taxes one dollar and fifty cents on the one hundred dollars of value; this is intended for the average for the county.

Susquehanna.—I paid this year's tax yesterday; valuation of eighty acres is \$1,550; tax as follows: County tax, fifteen dollars and fifty cents; special tax, seven dollars and seventy-five cents; school tax, sixteen dollars and fifty cents; poor tax, fifteen dollars and fifty cents; road tax, fifteen dollars and fifty cents; total tax on the \$1,550 of assessed value is sixty-six dollars and ten cents.

Susquehanna.—In Rush township in this county, sixty-five mills has been levied on the assessed value; in other townships it will vary from forty-seven to fifty mills.

Franklin.—The above farms were all sold last fall after second or third trial at public sale. The county tax in this county is four mills: the school tax, three, and the road tax two and one-half mills; the assessed value is equal to the actual value in most cases, and in some cases of actual sales exceeds it.

THE NEW WEST AND THE OLDER EAST.

By HON. JOHN I. MITCHELL. *Wellsboro' Pa.*

(An address delivered at the Wellsboro' meeting.)

Mr. Chairman, Ladies and Gentlemen: I have an apology to make this morning on account of the absence of many who would be interested in these meetings, but I don't know that I can expect them to be present—if I was a farmer I would lay it to the weather. I can only sympathize with the farmer in a practical way from my experience in a small garden. The farmers of this section ordinarily would have their seeding completed by this time, yet there are very many engaged in their planting and they are not through with their seeding and this is a misfortune with us, for, ordinarily, we should be through. Our people feel it very difficult to handle the land here when it is wet or very heavy, and that difficulty has extended into this middle part of June this year. We feel it to be a great misfortune but we trust that the harvest time will come.

Now the topic that has been advertised upon which I had expected to speak would be one of great interest if I had had the time to give to a study of the questions that I think ought to be discussed in connection with it.

Among my earliest recollections I remember hearing of a family near where I was born and brought up going west and settling on the Western Reserve in Ohio. At that time I remember hearing the talk about the neighborhood, and it was thought that that family had gone into the unknown wilds of the west. Yet we have lived to see this same flood of migration overspreading the whole of this continent from the eastern shores to the western seas. That was only some forty years ago, and yet that point in Ohio at that time was regarded as a very distant point in the settlement of the west.

When I was a boy on the farm my father had the kindness to furnish me with what I regarded as a very excellent paper for farmers' boys, aside from its political views, the *Semi-Weekly Tribune*, and I remember how Mr. Greeley advised "go west, young man." I was first struck with the effect of following this advice when I began to travel in the west and see how that country had begun to develop. In 1873, unfortunately for me, and for those who were associated with me, I had some little experience in Dakota and then had my eyes opened as to this great country and what it means in its development. I have often thought it was not wise to urge the settlement of the great west so rapidly as it has been settled. I have thought that had one head controlled the whole of this vast territory, that the settlement of the west

would have been conducted in more economical way. I have regarded this rapid settlement of the west as a very great disadvantage to the east. We have recently observed very much in the papers of the country in relation to the depression of agriculture especially in the east. Much has been said in relation to the depopulation of the eastern states, the abandonment of the farms of the east as they were conducted thirty or forty years ago. We regard this in our time as a very great misfortune for us. It has had the effect of distributing too rapidly very much of the zeal, energy and wonderful genius which the east possessed and yet this has done very much to improve the west. Very largely the populations of those states are made up of our most enterprising, most ambitious and thorough-going men of the east. It is wonderful to see how these eastern men strike out in that western country, in one respect I have thought, not wisely and economically on their part, because of the extravagance practiced there. I observed in Dakota that in the conduct of agricultural affairs the young disregarded the teachings of their fathers in the east in regard to economy. Especially so in the care of machinery. Yet, notwithstanding all this extravagance in the west, and there is a great deal of extravagance there in many ways, the east has not that to contend with now, but by and by they will learn to be more economical by reason of the competition that they must necessarily meet with in the production of the great staples in that country. I observed that, notwithstanding this extravagance at the time of which I speak, there was no possibility of the people in the east competing on equal terms in the production of the great staples in that section, especially in the raising of wheat; but at that time there was no such diversity of production in that section, as led me to believe that that country could be permanently prosperous and I then thought it must look in other directions and diversify its products and not depend alone on wheat raising. And so those who have observed the development of that country and the result of the over-production of wheat in this country, and especially when we consider the competition by reason of the great wheat fields in Russia and India, and the employment of agricultural machinery and of cheap labor there, we begin to see that there must be a diversity of production in order to continue profitable agriculture in this country, and I am glad to know that they are beginning to diversify the products of their lands so far as, they can, by reason of their location, climate and soil. This over-production is undoubtedly one reason why there is a great deal of depression in agriculture as we call it in these days. We see it all about us. We see depression in demand and consequently depression in prices, and that is an important thing to consider in this industry. We see that as one result of the wonderful rapid settlement of the west. And not that alone; for if the conditions of the country existed to-day as they did when that family of which I spoke removed to the west they would not have been able to compete with us as they have been enabled to do, by means of the rapid and cheap facilities of communication and transportation that have been developed in this vast country of ours.

If you look into the tables that give the statistics you will be struck at once with the low cost of transportation from that wonderful country to the east. If I remember correctly the cost per ton per mile for freight by lake and railroad over the great trunk lines from the west to the east in 1860, was a little over two cents. When I was in Congress, before a committee on railways and canals, of which I was a member,

very much was said in relation to this transportation. National encouragement was urged, which it was thought would result in reducing the freight charges to one cent per ton per mile. I remember there was a great deal of talk about it at the time among agriculturists and others. These same tables, if I remember correctly, show that in the last year the average cost per mile for this freight has been less than three-quarters of a cent. That is to say, it has been reduced from 1860, when it was something over two cents a mile, to less than three-quarters of one cent per ton per mile. My friends, those who reside in the eastern section of the country, can hardly realize to what extent this difference affects the relative interests of the two sections. We are glad to see this reduction; we are glad for ourselves on account of the staples we have to purchase from the west. And yet affecting agriculture in the east as it does (for it has a direct bearing on the condition of things here and brings us into competition with the west with its vast advantages, which for the time being are unequal and burdensome to the east), it is to this fact that I attribute in part the depression in agriculture in the east. If you will take the whole tonnage and make a computation you will see the difference that it makes in these freight charges. I don't know how much it amounts to annually, but it is a very great sum indeed, and that of itself is sufficient in my mind to account very largely for this changed condition in the east in relation to agriculture and the profits in that business here among us. We are to meet that, it may be, for a generation to come; but fortunately for us in the great and all powerful wisdom of our Supreme Ruler there is a law which operates upon these things much better than we could ourselves if we had absolute power and control. In my mind this agriculture depression is only of temporary importance. Though it is temporary it is just as important to the present generation but we trust it will not be so burdensome upon our children as it has been upon us.

I have a couple acres of land here in Wellsboro' and I would be very glad indeed, to give ten times as much as they are worth for agricultural purposes to take up two acres of land in the Red River Valley of Dakota and have them placed here. The natural advantages are to be considered in the different sections of country. It was unforeseen that the vast lands in the west were so well adapted to agriculture when the eastern lands were first settled, but it was very kind in Him, to whom we owe highest allegiance to permit the eastern portion of our country to be discovered and first populated, because if the great west had been discovered before the rugged hills and mountainous territory of the eastern country were, I fear we should have had no such progress in the development of our eastern shores as we have seen.

There is another thing which will be seen to have its weight in this same connection, arising out of the general suggestion I have made in relation to agricultural production. Not only do I think the cost of transportation and rapid facilities of communication have had a great deal to do with this depression, but the increase of agricultural products resulting from this rapid development of the west in all probability has a more weighty effect. For in agriculture, as in everything else, which has to do with commerce, the supply must have a certain relation to the demand, and of course with such a stimulated and rapid development as we have witnessed in the west the production has been abnormally increased, and to some extent this increased production has necessarily affected the prices in the east, and as I think, in an undue proportion to the increase of population in the country. Not long since

I read, in a hurried manner, an article in the *Forum* upon this development in agriculture and population, and I was very glad to see, and I thought it was very clearly shown in that article, that we are not to have very much to fear of the consequences of this increased production for any great length of time in this country, for the two reasons, that production has been urged by way of settlement of the west in this rapid and extravagant manner almost to its limit, and the increase in population is rapidly gaining on this our supply of agricultural products. There are remaining in the United States comparatively few large tracts of public lands open to settlement, so that the time is coming near at hand for the people in the west, this energetic and thrifty people, to meet the old question that those had to meet in the east, the question of economy—economy, because they are limited in the amount of land that they can take in the virgin soil.

I observed the little time I was in Dakota that some of the farms that had been farmed for some years were not nearly as productive as they had been at first. They do not take care of their manure; they burn it; they do not take care of the straw, do not regard fertilizing qualities at all; and consequently they are rapidly exhausting their soil of those great stimulants that are necessary to its fertility. So that there is a limit to this progress in the west to compete with the east and when that is reached the west will resort to a more economical management of their agricultural interests. The increase of population which formerly was at a less ratio than the increase of agricultural products seems of late years to be changing this relation. This ratio shows that there is a probability that in a decade, or at least two decades, the increase of population in spite of all this extravagance of the west, and all they are able to indulge in in that way in that country, will fully overtake the increase of production. When that time comes, that the increase of population shall overtake the increase of production in agriculture, this depression of agriculture in the east will not be felt as it is to-day. I think that is a happy thing for us to consider. The increase of population is wonderful, especially by immigration, and it seems to be going on as rapidly as ever and is likely to continue. This is a great country and its fame has spread world wide and the common people of all countries have come to understand it, and the impulse of the past will necessarily carry this immigration past the economical point. If those people were able to understand the change in our condition (unfortunately they do not), and if they were to understand the facts in relation to the increase of population in the United States and in relation to our business affairs they would observe that this impetus carries this increase of population by immigration beyond the point where reason would carry it.

Fortunately we are in one of those straits to-day, where we have reached the point in which we have to face, to my mind, a very serious question, and that is the question of production, not only in agriculture but in manufacture. Manufactories have so increased in the United States and the facilities for the domestic manufacture of those products we need have increased to such an extent that nearly everything we need can be manufactured in the United States, and because of this the home competition in many great lines of manufacture is so great to-day that it controls absolutely the question of prices without regard to our relations with respect to such manufactured articles to the people abroad; and by that remark I don't mean to be understood that such a change in our condition would permit us safely to depart from the

policy of still protecting ourselves against cheap labor abroad in order to compete successfully with that class of people with whom we must compete in these great lines of manufacture. The difference between the wages of the American citizen and the man who produces wheat in the wheat fields of Russia and India or iron in England is, without tariff created by legislation or otherwise, sufficient to justify a certain rate of duty to make up that difference as to manufacture; and as to agricultural products the reason is stronger. I believe in protection primarily and as I think justifiably because I think it is for us to do for ourselves in this country what God intended to do for all mankind. We simply thus place ourselves on equal conditions with other people. We endeavor to equalize our condition and to insist on such rights as we think we ought to maintain in a free country where the people ought to control their own affairs.

This subject of the cheapening of transportation and this increase of agricultural products I thought would be of sufficient importance to present to this Board for their consideration and I shall content myself with merely making these suggestions and with possibly adding a word or two by way of suggestion in relation to other things which have a more direct bearing on this question of agricultural depression, and they are of more importance to farmers because they are among those things which they have most largely within their own control. These other things which I think should be considered, by farmers, have relation to the things which they have to contend with as affecting their produce, their market and the prices of their products in the market. That is to say, if a farmer here in Delmar township, adjoining this village, thinks proper to go on year after year denuding his farm by the ton, by the score of tons of hay, year by year and robbing the soil of its natural support he must expect a reverse in his prosperity from that one cause and it would be wise in that farmer to stop and reflect whether it would not be advisable to find a market for something else than to rob his fields of the hay that they should have for their fertilization. I have thought, I am not wise on this subject, I will admit, but I have thought that if the eastern farmers, and especially in this grazing section, would turn their attention to sheep husbandry, not primarily for the profit of making wool alone, but I think in the use of mutton for the household and for market that they might have, that it would be of great profit to them. I remember when I was a boy that the common meat food among the farmers was pork. We lived principally on pork. We would have a few chickens, of course, and sometimes the neighbors would kill a calf and bring in a quarter and we would return the compliment, and then sometimes they would send us a quarter of sheep. I believe not only the profit in the wool, but in having mutton for the table, and spring lambs here within easy reach of the eastern markets, that sheep husbandry should be encouraged. It seems to me it would be the highest wisdom for our farmers to consider whether it would not be better to take this business up in place of denuding their lands from year to year. So that one of the things that the farmer may remedy is by the study of his business, study of the market, cost of transportation to a central location, the products that he can economically produce in his section, and in that way endeavor to diversify the uses of his farm. I don't suppose it is in the power of every farmer to engage largely with profit in raising spring lambs. I don't suppose that every farmer can compete with the gentlemen who have done that kind of business alone, but especially would I urge it upon farmers to

indulge in this to that extent at least that they would change this habit of using salt pork, salt fish, Sunday, Monday, and every day of the week through the whole year and give their boys and girls a taste of fresh mutton and veal on the table more frequently. Incidentally as connected with that, I regard this policy of substituting sheep as husbandry as vastly important to the agriculturists of this country by reason of the fertilizing results being so large. Not long since a gentleman up in York State, who is good authority on this subject, said, he thought that twenty-five per cent. of his profit in sheep husbandry resulted from the fertilization of the soil. Farmers must remember that they cannot safely "rob Peter to pay Paul;" they must give the soil sustenance and save it from this system of robbery and they will certainly receive equivalent returns from their lands. If you go on and raise hay and sell that off and raise oats and sell them off and other things, in bulk, you rob the soil of its proper nutriment.

Then I remember thirty years ago it was regarded in our section as profitable to raise young cattle for sale and also for home use. By so doing farmers necessarily increased the fertility of their farms by consuming the coarse fodder and buying from their less intelligent neighbors. But unfortunately this wonderful development of the west to which I have alluded has changed the conditions in that line now. I think it is no longer profitable for farmers in Tioga county to raise young cattle and sell them off of their farms and perhaps not in any other section of the east. And that has resulted very largely from this development of the west and the covering of those vast fields, those large ranches, with cattle, while the farmer in the east produces his cattle on his own farm, thus putting him in competition with the boss ranchmen of the west, and I doubt whether that will change for some-time to come.

We have in the east seen an improvement in the raising of horses, which I suppose must be reasonably profitable or we would not see so much of it; we all feel interested in the culture of good horses, and doubtless there are good profits in it. I have thought that our energies should be turned more for improving this stock for draught horses for the farm instead of for fast horses, although I suppose the profits are very much greater in fast horses in some instances. I might remark that we live in a fast time and that there have been great changes with reference to the habits and the management of farm matters in these days as compared with thirty or forty years ago when I was on the farm. I am very sorry to say as one result of the introduction of the sewing machine era, so to speak, I fear that many girls are growing up to be less industrious than in the olden time, and I fear in neglect of some of the principal duties of house wifery, and the change in that respect has, I fear, been a detriment to the industry of our homes. We are all glad to see these improvements and we will be glad to welcome and enjoy this improvement in the condition of the American home in all respects and in all relations, if it can be afforded precisely as it is indulged in, unless it shall result in an effeminate race, and in shirking the labor of the hour for the rising boy and girl in this country. But I fear it has to some extent had the effect on the present generation that they are disposed to look to those employments in which they can secure a livelihood without the exertion of the energy that must be exerted for intellectual as well as moral and physical growth.

I don't say we should card wool and hetchel flax with the hand, but

I do say that this changed condition in American home life has a tendency to this bad effect; and I fear it has very largely that effect, for I find it very hard to find a young girl or boy as devoted about the house, the farm or the garden as in former years. When we were boys we were very glad to get away once a month instead of two or three times a week. I believe that very many of these things have resulted in what we call agricultural depression and from causes lying close at home, at the doors of the agriculturists—very largely so, because it is perfectly natural for us all to indulge ourselves. We like to meet together and have a good cup of coffee, good horses, a piano in the house, pictures, and they are all right in their places when they can be afforded. I believe that they are a necessary part of the home, if they can be afforded, in order to make and keep the nation what it should be to hand down to coming generations; but I say if we are to allow these things to denude us of our manhood and womanhood then they will be a curse to our coming generations, and the effect upon the progeny of this generation will come down in the coming generations and we shall experience what other countries have experienced in their decline and fall from similar causes. We use a great deal more coffee and a great deal more sugar, tea and other luxuries than we can afford and we don't stop to consider.

Unless the American farmer stops to consider the things that lie at his own door how can he expect to improve his condition? Agriculturists will not only find causes of unthriftiness in their own immediate families but they will find their effects in their children's children. These are important things for us to bear in mind.

I remember a month or two ago when there was a meeting of this institute held here that I listened to a gentleman from York county, upon a kindred topic. I want to say in that connection a word with reference to a statement that was made by him as I think it ought to carry along with it a remark by way of correction: He stated that the census of 1880 showed a reduction in the value of farm property in the United States. The census, as the figures are given, does show a small reduction but he did not remember to state that the census of 1870 was taken at a time when we were in the flood tide of high prices and when the prices were as reported by the Superintendent of the Census about twenty per cent. above the gold basis. So that in considering the census in relation to that time, it is important to bear in mind the relation of prices with respect to a gold basis. I do not believe that agricultural property was less in 1880, than in 1870. Of course, there are local causes which may affect it in some sections but in the main agricultural property has increased in value very largely, I have no doubt and I think that is the general opinion among the people. It is true you may not be able to sell a farm at as high a price now as then but you will remember that everything was inflated and it was not in the increased value of the property but in the changed condition of the finances of the country that these prices ruled at that time as they did. A man would say, I can afford to buy a piano, I can afford to send John to college or Mary to the seminary, but when pay-day came, it come down to the standard of actual money and he found his farm was the same as before and that the weight of mortgage upon it was a great burden to him.

Here is another subject to consider, the question of debt. There is nothing in the world that makes a man so great a slave as debt. It will cause him to keep awake at night, cause him and his family to do

without those things which they need and ought to have; it makes men hopeless and spiritless, and if the American farmers would consider it more than they do I believe that much of this depression would be removed, because there is a great weight of mortgages on agricultural property to-day, the interest must be paid, whether the land is profitable or otherwise. And thus debt depresses agriculture. There are a great many other things that might be suggested in this connection but I think I have referred to a sufficient number that very closely concern us all, in order to give you my opinion as to some of the causes which has led to the depression of agriculture in the present day.

J. A. GUNDY. I believe, as my friend Senator Mitchell has said, that our depression is due largely to the abnormal development of the west. We obtained these western lands by purchase with money obtained from our forefathers by taxation; it was the heritage of our fathers. We used to say when I was a boy that Uncle Sam was rich enough to give each of us a farm; he is no longer rich enough to give each of us a farm. See what was done in order to develop this great west; these corporations went into the Congress of the United States and asked for immense land grants, to induce them to build railroads; they gave them each alternate sections. These men put their money in and built the railroad across the continent. What was the result? These railroads were not profitable and these lands were not profitable and what did they do, while the freight rates were put down in the west they were put up in the east. Don't we owe that to bad legislation of our friends in Congress? However, it occurred before my friend was there. I say that it was owing to bad legislation that we got into that hole. This last winter they wanted to use money taken out of our pockets to irrigate the lands of the west, to take more land for the western land grabber and make our lands cheaper and then buy more Indian lands. It is not Russia, Prussia or Asia that have ruined our great grain trade, it is the United States Congress. I think if Senator Mitchell will look up the census report of 1880, and 1870, he will find that during that decade there were something over one hundred and forty thousand less small farms of five acres and less in the United States in 1880, than there were in 1870; that there is in proportion less owners in 1880, than 1870. Why was it? What became of these small farms, one hundred and forty thousand more, in 1870, than in 1880? Where did they go to? Look on the other side; there were five hundred and some odd thousand farms less than before. The fact is that they have gone into the hands of the few and out of the hands of the many, and that is where we are drifting.

Mr. POWELL. I feel that I should make an apology to Senator Mitchell for saying that he had no experience with fast horses; I knew he never had for he was speaking of the profits. No people, as a people, ever grew rich with fast horses.

Mr. GUNDY. And they never will.

Mr. POWELL. Impossible! Why, because the fast horse makes no production. Two men may go into a horse race, one wins and the other loses, the winner leaves no equivalent for the money he has taken, consequently he is a robber. Every school boy might own a trotting horse yet a stake of school boys with fast horses would never grow a hill of beans. Why, because they make no production—they consume instead of produce. I was very glad to hear him speak about what we should grow, and what is that, that there is more profit in growing other things in these hilly counties than fast horses. You have the

right kind of soil here, you have the right kind of water, you have the right kind of grass. Whenever a country has produced a strong and healthy people that same country will produce a strong, healthy and enduring horse. The mighty west can't cope with you here in horses. A horse must be domesticated from youth up. He can't run wild on the lands and in herds and then make a safe horse to carry your family; running in wild herds and being herded in the manner in which western horses run disqualifies that horse in comparison with where you have fences and barns as you have in the east, and where you have boys to educate these colts, there you can grow them with profit. What kind of horses are best to grow I leave with you. But mark it, there has never been in the history of the world a time when it took so much of the products of the land to buy a valuable horse as to-day, it takes more pounds of beef, more pounds of mutton, more pounds of wool, and more bushels of grain, to buy a good horse than ever before. It is our thoroughly domesticated horses that are bringing the prices, and the only way to have them educated from colt-hood to maturity, consequently you need never fear that the west is going to trespass on your profits in growing good horses. They can't do it until that country is more vastly covered with fences and good barns with stalls in them and all the other necessary appliances for domesticating them. They can't do it as long as they herd them out. So you have no reason to have any fear of the west curtailing the prices of your horses here. Then, again, he spoke of sheep as the next best profit for the man of agriculture. It is an old saying that "The hoofs of sheep are shod with golden shoes." It is a true and beautiful saying. Where a people have grown sheep extensively that people have become rich. Washington county, in this state, one of the wealthiest counties in the state, has more mortgages on farms in the surrounding counties than any one county in the state and all made in the profits of sheep growing. First, because they enhance the fertility of the soil and then you have the natural increase of your flock and increase of the mutton, and then the clipping of the wool, all of which make continual returns from the sheep. When the panic struck us in Ohio, Cadiz, Ohio, had deposited in bank there from Washington county one thousand dollars to every man, woman and child. I suppose no other such showing can be shown in the country. Why? because this profit had been made in growing sheep. This is another product that I have no fears of the west competing with the east. Why? because sheep require the same care and domestication as horses; they can't be grown in large flocks, the loss is too great. To be rich you should have small flocks; when you come to herd them the disease gets among them and the losses are great. They have no equipments or buildings in the west for the sheep and they have no chance to compete with us here. In the early lamb products the west can't ship their early lambs into New York market as conveniently as we can. Why? because we have our lands and our hill-sides and our buildings and building material where they can be cared for and they can be shipped into New York fresh from our lands.

Mr. GUNDY. Can't they ship them dressed?

Mr. POWELL. No, sir; not so well because you know very well that it loses its flavor. Mr. Woodward told me that he made \$12,500 with one crop of lambs one year. Who of us are making that on any other farm product on two hundred acres of land. Here is a product that the west can't compete with us. We have a grass country well adapted to the growing of sheep and are in good access to the eastern markets. The

Senator spoke of the west and the depression of the agricultural interests in general. I don't see how agriculture in general can flourish or prosper for a time to come. I remember of reading the same article in the *Forum*, and I might say here that there are millions of acres or lands in the west yet that are not reclaimed.

Mr. GUNDY. And in the south.

Mr. POWELL. Until a change of climate takes place we will not want to go south. I think the Senator overrated the amount of land reclaimed there—much of it has been taken up. Iowa has thousands of acres; Minnesota, Dakota, and the territories have immense tracts, and as long as foreigners are coming to our shores and living as they live and will live, living on the coarse food and cheapest kinds of clothing, living in dug-outs and studying economy such as Europe will teach them to study, and we have to compete with this kind of labor and cheap acreage, I don't see how we can compete with the west—we have to take something different. I bought six thousand acres of Dakota lands yesterday. Do you suppose there are farmers here who can compete with that land? We must grow something that they can't grow, either a class of animals suitable to send there for breeding or draft horses that the west can't grow, or something that the west can't grow. We can't afford to pay forty and fifty and sixty dollars an acre for land here and compete with the west where I can buy it at one, two and three dollars per acre, where I can work three acres easier than one acre here, and where I can raise two and three times as much there as here on the same extent of ground.

J. P. BARNES. What is the average?

WILL B. POWELL. Go to the Red River Valley of the north and see what wheat you get there. So you can go into Kansas and you can grow three times as much as you can here and where you can till three acres there where you till one here. We can't compete with them here, and as I say we must grow something that the west can't grow.

J. W. MATHER. In any one of our stores in this place where they have the article on sale you will be able to buy butter at ten cents a pound and at our meat markets you will have to pay twenty-five cents a pound for mutton.

J. B. SMITH. I must say that I was very much amused at the three gentlemen who have been discussing about this farm business. One talks one way and another another, and another another. My experience in farming is that it costs just as much to raise a bushel of wheat in Colorado as it does in Pennsylvania; I am raising it in both places; and lots of farms in Colorado you can't buy for seventy-five dollars an acre. What is the trouble there? There you have to irrigate and pay one dollar and fifty cents an inch for water; you don't have to irrigate in Pennsylvania. The only way for the farmer to do in Pennsylvania is to put his land in order. Where he is raising ten bushels an acre he can just as easy raise thirty. They don't raise more than about seventeen bushels to the acre in Ohio, but I raise forty bushels because I put my land in order. You can't buy a farm from here to Iowa for twenty or thirty dollars an acre. If we have got so far behind and can't compete with those western men we better sell out. Who lives out in the west that we should be so much opposed to the western people? Ain't our children there, and why should we go back on them? What we want in Pennsylvania is to have manufacturing establishments to eat up all the grain and stuff that we raise. Here in this town there should not a bushel of wheat go out; there ought to be a manufactur-

ing industry here to consume it. If the west can come here and compete with you in Tioga county then you better go west, I am not going west. When I was in Denver three weeks ago the men were coming there to buy cattle and they said cattle were going up and so they will go up. I am raising cattle there and raising horses there. It costs more to hire a man there than it does in the coal regions; it will cost you twenty-five dollars a month and board him besides and then he may jump your land when your back is turned.

THE SITUATION.

By the SECRETARY.

It has been claimed, and the claim has been reiterated upon all sides, that there has seldom, if ever, existed a period of so great depression in the agricultural world than at present; many theories have been advanced to account for this condition but many of these will not bear careful investigation and none of them account for all of the many phases of the question as they now exist.

After a careful investigation of the question and no little acquaintance with practical farmers we incline to the opinion that, at least a portion of this depression is the result of an overestimate of facts and of effects, and that much of it is due to the contraction of values which followed the inflation during the war; other trades have gone through similar periods of depression, but it would appear that farms and farmers were among the last to feel the contraction, at least so far as the value of their farms is concerned.

Notwithstanding this depression we find in every community farmers who are quietly making money; not so fast it is true as when wheat was worth two and one-half dollars per bushel, but they are still laying by something each year. From this it would appear that the depression does not extend to all in the same calling alike.

So far as our personal knowledge goes we find that those who complain the most of this depression, and those who feel it most keenly are those who, during the times of inflation and high prices, bought land and went into debt for a portion of it. Such persons find that the contraction is uneven and is confined to that portion of the farm which is paid for and not to the mortgage. Under this train of circumstances we know of farmers who, when land was at or near its highest point, purchased farms and went into debt to the extent of one-third to one-half of the value; some of these farms, if put into the market to day would not bring the amount of the mortgages against them, and yet their owners have been industrious and have made something each year, only to find that the contraction in value more than equaled their ability to pay off the mortgage. This class have and are suffering severely by the contraction which has taken place in the value of land.

Another class who also suffer are those who, when wheat was two dollars and one-half per bushel, used their surplus to add to their acreage instead of paying off a portion of the mortgage already upon their farms; for the purposes of paying off a mortgage a bushel of wheat was then worth two and one-half dollars, but for no other pur-

pose was it worth that amount of money; a mortgage was the only possible investment which would not and which did not contract in value and those who then took advantage of this increased ability to pay off debts are the fortunate ones to day.

At many of our agricultural meetings we hear much said in relation to the great contraction or fall in the prices of farm and farm land. Much of this comes from those who have never examined the figures of our census returns and who base their assertion and calculations upon the generalities without the figures and proof to back them. Our census returns for 1850, 1860, 1870 and 1880 gives the following figures which are worthy of the study of practical farmers who wish to obtain a correct idea of the situation. The following table shows the contraction and expansion of each decade, and we very much regret our inability to add those which represent the period from 1880 to 1890; we have no means of obtaining them as the data from which they can be obtained has not yet been tabulated and they are still in a shape which render them unintelligible for practical purposes.

The following figures, taken by decades of ten years each, apply exclusively to our own state;

Value of farms, 1860,	\$662,050,707
Value of farms, 1850,	407,876,089
Increase,	<u>\$254,174,618</u>
Value of farms, 1870,	\$1,043,481,582
Value of farms, 1860,	662,050,707
Increase,	<u>\$381,430,875</u>
Value of farms, 1870,	\$1,043,481,582
Value of farms, 1880,	975,680,410
Decrease,	<u>\$67,801,172</u>
Total amount of increase from 1850 to 1870,	\$635,605,483
Total amount of decrease from 1870 to 1880,	67,801,172
Increase of value remaining in 1880,	<u>\$567,804,311</u>

These figures thus indicate that unless the value of the farms of our state have decreased to the amount of over \$567,000,000 since 1880, we have not yet reached their values as they were in 1850. Various estimates have been placed upon the shrinkage of values from 1880 to 1890 but we believe none at least to our knowledge have placed it so high as the differences shown above.

It would naturally be expected that this contraction of values would be most felt in counties remote from good markets and without good facilities for getting their crops to market; this is in exact accordance with the facts and most of our complaints come from counties thus situated.

When we come to examine into the main cause of this depression among farmers of the present time we find it in the prevailing low prices of all kinds of agricultural products. In order that the reader may judge of the amount of this decrease in prices we append those as shown by quotations in Philadelphia market on the 1st of January of each year named in the following table:

	1850.	1860.	1870.	1880.	1890.	Average.
Flour,	\$5 45	\$5 65	\$4 50	\$4 75	\$4 35	\$4 94
Wheat,	1 25	1 32	1 28	1 48	90	1 25
Corn,	61	74	85	62	42	65
Oats,	42	44	55	47	29	43

Second in our list of causes of this depression, and very close to the decreased price of farm products, we may place the fact that the cost of their production has not been decreased in proportion. Labor is almost as high as at any time in any of the decades above named; taxes have not decreased; in fact most of the items which make up the cost of farm products remain at their former figures. For several years the Board obtained from its reporters carefully considered and prepared figures showing the actual cost to the producer of each of our leading farm products; a comparison of these figures with those above given for the last decade, show the two columns to be fearfully near together in their amounts, and the margin for profit to be very small.

Andrew Frantz, of Lancaster county, in an essay read at one of the Lancaster county farmers' institutes, thus illustrates not only the question of this contraction in values but also shows that in Lancaster county at least the contraction does not yet equal the inflation of the three previous decades; he writes as follows:

"In considering the question before us (the depreciation in the price of land in Lancaster county), it is important that some particular period be taken as the turning point. Having fixed this point take it as a summit, and trace the movement upwards and the depreciation downwards; see how things moved up and how they came down. In following my line of thought, upon this plan, the year 1868 is considered as the culminating era. It was at this time that the highest prices during forty years prevailed. Going back over a period of twenty years and forward twenty, including from 1848 to 1888. In the retrospect we find that the price of land advanced, taking it in round numbers for this purpose, one hundred per cent., or from ninety dollars to one hundred and eighty dollars per acre. It has depreciated about twenty-five per cent. (in 1889), or from one hundred and eighty dollars to one hundred and thirty-five dollars. The price is still fifty per cent. higher than it was in 1848. It is safe to say that land in Lancaster county is in reality not worth any more now than it was twenty years ago, while it sells at fifty per cent over and above the then prices"

These figures of course apply only to Lancaster county but we think that, with changes to fit them to the variation in surroundings and circumstances, they will suit many portions of our state quite as well. The prices in Lancaster county may not have been attained even at the highest point, but neither was the minimum as high. Some of our correspondents in Susquehanna county claim that the depreciation in the value of many of the farms in that county have been fully fifty per cent. from 1865 to 1890; other counties in the southeastern portions of the state estimate the decrease at from twenty to twenty-five per cent; as previously stated we find the decrease greatest in counties distant from market and where taxation is highest. A county levying but eight and five-tenth mills has advantages over one which taxes farms at the rate of over nineteen mills on actual value, and this difference

will exist no matter what the price of land may be, but it is always most felt and most apparent when the lowest prices are reached.

Even the most skeptical reasoner must admit that there must be some cause for the prevailing low prices besides the contraction which always follows unhealthy expansion; we have not only gotten back to the prices of 1850 but we have fallen below them. Until we reached the level we were justified in calling it contraction, but after we pass the level we must find some other cause to which to charge the further reduction. Ordinary contraction would not keep the price of the average bushel of wheat below one dollar, and there are evidently other causes at work. Contraction following expansion we may be able to control and remove other causes operating in the same direction.

We think that the present unusually low condition of the grain market is due to two causes which, working together, have brought prices to their present point; we mean over-production and freight discrimination.

We have placed over-production first because we think it the most important and that it has by far the greatest effect in producing the condition complained of; if there was no over-production there would be no freight discrimination as we now have it; and even if it should exist, its effects would not be so perceptible nor so disastrous as they now are.

In fact we may regard freight discrimination as over-production endeavoring to release itself at one point at the expense of another, or in endeavoring to transfer the trouble from the western farmer to his eastern brother.

It is scarcely a fair argument to assert that if every human being had enough there would be no over-production; we must deal with facts as we find them, and the fact that some have more than they need and others have not enough cannot materially affect the practical bearings of the case. The fact that persons in the interior of Europe have not enough wheat will not materially affect the price of our wheat unless freight rates are such that we can get our wheat to them at a cheaper rate than other competitors in the same market. Grain markets are not regulated by theories but are governed by facts and by facts alone.

It is a fact that the market value of our wheat crop is fixed, not so much by the laws of supply and demand, as by the prices which it will command in some foreign market; and the price not only of our surplus but also of the whole crop, is fixed by what that surplus will command in the world's market, and in the present condition of affairs the price of our whole crop is governed by the price of wheat in Europe.

Such being the case it is but proper that we should give some attention to the supplies which feed this market and trace the supply to its source.

Within the past twenty-five years a foreign market which was then largely our own has gradually slipped away from us into the hands of competitors scarcely dreamed of twenty-five years ago. British capital in India has developed that country and, coupled with cheap labor and low transportation rates, has increased the out-put of wheat to such an extent that our market is slowly but surely getting away from us; every mile of railroad constructed in India by English capital, satisfied with a low rate in interest, opens up miles of new wheat fields which, with the cheap labor close at hand, can afford to enter a market which even our western farmers, assisted as they are by discriminating freight rates, can hardly hope to enter with profit.

Egypt, brought five thousand miles nearer by the Suez canal, is becoming a competitor in European markets. Russia is, by railroad construction and internal improvements of all kinds, opening up thousands of acres of wheat land which, though not producing as well as our western prairies, will still produce even the moderate crops so cheaply and get it to market at so small a cost, as to compete in the same market with profit.

Fifteen or twenty years ago the South American states bought largely of our surplus wheat crop; within the past three years they have exported on an average \$10,000,000 worth of wheat, and by means of refrigerator steamers are shipping the carcasses of cattle and sheep to Europe, where they are sold at prices which have practically driven our western shippers out of the market; on the South American pampas, where a few years ago cattle were killed for their hides and tallow only, they now have a value of from twelve to fifteen dollars for shipment as beef. Large areas capable of producing twenty bushels of wheat per acre have been brought under cultivation; immense mills have been erected to prepare this wheat for market; thousands of reapers are sold every year to cut wheat on land on which the cattle herders were formerly fed upon grain produced in the United States; a single firm ship the carcasses of over seven thousand cattle annually to Europe, and another firm have over \$18,000,000 invested in the manufacture of an extract of beef.

It is true that none of these products find their way to our markets, but it is equally true that they do get into the market which fixes the prices of our crops and in this way affect us almost as much as if laid down in New York or Philadelphia.

The indications from all of the points which we have named appear to show that this competition has not yet reached its maximum and that the same rate of increase may go on for a number of years, but the indications in our country are that we have passed the maximum of crop production, as compared with consumption, and that we have probably started upon the other course and in a few years more we may pass the point at which production and consumption are equal.

In a recent lecture, Dr. Collier of the New York Experiment Station used the following language:

"1st. Our population is increasing at a rate of nearly three per cent. a year.

"2d. Our consumers of agricultural products are increasing at a more rapid rate by far than are the producers.

"3d. At present we consume ninety per cent of all of our agricultural products.

"4th. The average crop producing capacity of our soil is diminishing in the United States.

"5th. From 1866 to 1886 the area devoted to our leading crops increased one hundred and twenty-seven per cent., while our population increased during this period but sixty-nine per cent., and while everything points to the fact that our arable land is largely occupied, as witness the haste to possess Oklahoma, and the efforts to reclaim the arid regions of the west, there appears to be no evidence that our population will not steadily increase.

"At present ninety per cent. of our products are consumed at home, or ninety-five per cent. not counting tobacco and cotton. It scarcely appears a hazardous prediction that within five years, and perhaps sooner, the home demand may fully equal the supply of our agricultural pro-

ducts, and then, if they are wise, the farmers of the country will be masters of the situation, and the words of Napoleon that 'agriculture is the basis and strength of all national prosperity,' will be recognized as sober truth."

In addition to this over-production, the eastern farmer has to contend against a freight discrimination which, while it assists the western farmer does so at the expense of his eastern brother. The interposition of freight rates has in great measure counteracted the natural laws of supply and demand and has practically placed the wheat grower of Dakota as close to his market, except in point of time, as is the Pennsylvania farmer. It has destroyed or nullified the laws of distance and location and by means of a system of special rates will place Dakota grain in New York elevators at an additional cost for freight which will place it in the European market as cheaply as our own wheat grown close to the seaboard. It has been stated that Dakota wheat is placed in New York elevators at a cost of twenty-seven cents for freight and charges; compare this with the eleven cents which grain produced in southeastern Pennsylvania must pay to get into the same elevator; one lot is carried fifteen hundred miles and the other but one hundred and twenty-five miles; if the fifteen hundred mile rate is right then Pennsylvania grain should be placed in the elevator at a cost of not more than two and one quarter cents per bushel; if the one hundred and twenty-five mile rate is right then Dakota wheat should pay one dollar and thirty cents per bushel; or even suppose that Dakota wheat paid one-half the rate per hundred miles, it would cost the producer sixty-six cents per bushel freight.

An Adams county farmer recently purchased some potatoes for seed in Iowa and was surprised to find that the freight from the west was thirteen cents per hundred pounds, or exactly the same amount as he was charged for transportation to his own market less than sixty-five miles distant.

Unequal and high taxation has also been assigned as one of the causes producing the present condition of affairs in agriculture, but while this may have an effect it certainly is one of the minor matters, for if the whole tax now levied upon a Pennsylvania farm was remitted it would assist but little. But because it is a minor cause it should by no means be neglected, but as it will be more fully discussed hereafter in an other paper we will not further allude to it here.

Such then are some of the evils of which the farmer has the right to complain and although many of them may be small of themselves, yet from the fact that they are all hung upon one side of the beam their weight is not to be despised, and they each and all should be included in any attempted remedy.

In any other trade the remedy for over-production is to curtail the product until the condition of the market shows that the surplus has been consumed or shipped away so far that its presence does not affect the market at home; all other trades have their trades-unions, and manufacturers of almost all other products meet for consultation as to the comparative condition of production and consumption, and some superficial observers ask why farmers cannot do the same. We answer that we can hardly imagine a condition in which the producers of wheat can or will control the amount produced; even if it were possible or practical to fix the acreage, the variations in seasons, which cannot be anticipated, would effectually nullify all calculations and plans. The difference between a short and a full crop, even on the same acreage, would

destroy all the effects of the plan. Another difficulty is to be found in the fact that farmers must have cash at a certain date to pay rent or interest on mortgages; they cannot hold their stock, and even if they were able to do so for even a short time might be subject to a loss which would more than over balance the profit.

In no better way can these evils be understood and corrected than by farmers meeting together for the purpose of discussion. Any meeting of farmers whether it be a farmers' institute, grange, alliance or farmers' club, will and must result in good if it is properly and judiciously managed. In such meetings politics should have no place; principles should be thoroughly understood and men who will carry them out supported. But it is very important that the effect of certain lines of action should be thoroughly understood so as to avoid errors which may not only fail in giving the aid expected, but which may, on the other hand, leave farmers in a worse position than they were before.

Those who attend such meetings should not be carried away by the arguments of those who have some special point to prove or gain; in such meetings the man with a hobby has no place; no demagogues should be encouraged; what is wanted is that underlying principles should be thoroughly understood and a clear view obtained of the result of indicated lines of action.

Twenty-five years ago we would have been told that this was impossible; twenty years ago we would have been told that such an attempt would surely end in failure; fifteen years ago we were told that an intelligent organization among farmers was impossible on account of their isolated positions; ten years ago this was by no means so certain, and now, by intelligent and enlightened non-political action, farmers are getting into a position in which they may clearly and plainly make their wants and needs known and having made them known in an intelligent manner, may advocate them as would any other body of men working towards a common purpose.

PAST, PRESENT AND FUTURE CONDITION OF THE FARMER.

By M. G. BROSIUS, *Chatham, Chester county, Pa.*

In the consideration of the subject before us now, I wish to call your attention, for a few moments, to the time when our parents first made the effort to gain an independence in these beautiful valleys, then more thickly wooded, some of the farms having but little cleared land thereon, and were purchased at from seven to twenty dollars per acre. It was necessary for them to at once turn their attention to removing the timber and improving the land. The latter was done principally by the use of lime, and in its preparation two objects were gained, as it required the cutting of considerable timber to obtain wood sufficient to burn the limestone.

After they had succeeded in clearing and improving the land, next came the raising of crops, which was a continuance of manual labor. The preparing of the ground was done with horses and oxen, but the harvesting was done by men and women. Grain was cut with the sickle, and later with cradle. Grass was cut with the scythe, was

tedded and raked up, loaded and unloaded by hand. They had no threshing machines with which to separate the grain from the straw in a few hours, but patiently and perseveringly applied the flail day after day and week after week, and when ready for market the great wagons and long teams were necessary for its delivery at market. It was in these days that our people seemed nearly on an equality, none having arrived at a state of financial success as to elevate them very much above their neighbors. All lived in moderately built houses, with plain furniture. The acquiring of wealth at that time was attended with so much difficulty that the masses preferred to live in comfort, ease and happiness rather than strive to gain wealth and ascendancy.

Their social habits at that time, we must admit, were better than they are to-day. Fine carriages were a curiosity, piano-box buggies were unknown, and a young man was fortunate if he possessed a horse and could ask his best girl to take a seat in the rear. People went to church in white-covered wagons, on horseback and on foot. All seemed satisfied with their situation.

Time rolls on. Education advances, and with it comes the advancement of scientific investigation and philosophical appliances; the old log houses and barns begin to disappear, and new structures of far more attractive appearance and convenient appointments are seen looming up in all directions; the expression on the face of the farmer was that of pride, happiness and contentment; the people of the rural districts did not attempt or care to in any way imitate or even investigate the condition of their city friends, but seemed to enjoy the freedom of a country home. It was then that the son of the well-to-do farmer asked no greater boon, aspired no higher, and found his greatest ambition gratified in the possession and management of a farm equal to that of his father's. It was then that the daughter sought no better nor happier lot than her mother's—to preside over a neat and well-managed farm-house. The great enemy to social happiness has not yet made its appearance sufficiently formidable to be noticed by the average farmer.

Time rolls on, and with the new time comes new things. The old way and manner of doing things are changed, new inventions make their appearance, the farmer's revenue increases, he adds to his lands, he improves his buildings, he invests in labor-saving machinery, he finds himself riding in fine carriages, he has money to invest in costly furniture, and in his great desire to advance his interest and calling he educates his children in order that they may be able to keep pace with the advancement of the age.

About this time land is selling at one hundred dollars per acre, and the farming interest stands on equal footing with other industries, and when happiness seems about the maximum the farmer observes in the distance a dark cloud that is destined to make him restless and fearful of the welfare of his industry and future prospects. He notices that in the multiplicity of governmental offices and the development of professional and mercantile industries, situations are offered that are inducing the best element to leave the farm and embrace the opportunity of leading what is now beginning to be a more desirable life. However, for a period this does not seem to be of great import, but as time passes obstacles seem to loom up to the detriment of the farmer's interest. Great railroads are extended to the great west, which, during all this time, has been filling up with the bone and sinew of this and other countries until the productions there are overflowing and needs

only the iron horse to bring them to our market to lower the price of our produce and reduce our income. In the meantime great wealth is being accumulated and combinations and monopolies are being formed that not only interfere with the interest of the agriculturist, but have a baneful influence in tempting the young of the rural districts to embark in the same undertaking. It is now that he notices the inclination in his son to leave the slow but sure road to success and independence that his father pursued and fly off to town to engage in some occupation, in many instances far more exacting, more confining and less remunerative than would have been his lot on the farm. The daughter, also, has the same inclination to leave the homestead and engage in school teaching, sewing or clerking in preference to the household vocations of a farmer's daughter, thereby compelling her aged mother, who has spent her vitality in rearing a family, to continue her toil when every sense of right and justice would demand that she should have the privilege of ending her days in ease and comfort; would any one wonder that the old man, knowing that he must soon relinquish the management of the farm, is amazed at the outlook? He rallies once more and thinks perhaps a higher education will teach the young idea that labor is honorable, and that honest industry is the true road to success and happiness. But, alas! he is only to find that so far as education has yet advanced, it has the contrary effect.

Time rolls on. A few more years finds the farming interest far below par. A large portion of the best element has been taken away from the farm to support other industries, which are much inclined to come to the farm for recruits. Land, in consequence, depreciates in value for the want of buyers, as the unsuccessful of other pursuits cannot succeed as farmers, and consequently if the best element is withdrawn the industry must suffer. These circumstances have been gradually surrounding the farmer, and now find these beautiful country homes with all the attractions that can be brought to bear—many times with splendid buildings, nicely located, and in a high state of cultivation—begging for owners at a price below the cost of the buildings, thereby reducing the cost of the land to less than our grandparents paid for it, covered with wood and unimproved. What a state of affairs for the true agriculturist to reflect upon! What is to be done? Where will we land? We hear it prophesied that the time is not far distant when society will be of two classes, the very rich and the very poor, and that the aristocracy will own all the land and it will be worked by the poor, as it is in Ireland. We are not inclined to such belief; we have too much confidence in the intelligence of the American farmers to think that they will permit the downward tendency to much longer continue. The time will come, if it is not already here, when the voice of the farmer must be heard in advocacy of his rights. The halls of Congress and the assemblies of the states are as free of access to the farmer as to any other class, if we could get them to realize the fact. As Governor Beaver has said, "the farmers, representing the agricultural interests of the states, are bound to receive at the hands of the legislatures and the executive, that consideration to which the great interest which they represent is entitled, and if they fail to make their power and influence known it is their own fault."

The future condition of the farmer depends upon his ability to cope with the times and enforce recognition of his industry. We think that the foot of the hill is, perhaps, nearly reached. The agricultural interest is at this day gaining influence in the halls of Congress, in the

Cabinet, and the whole country is being agitated in our interest. What possible reason could be given for the greatest industry on the face of the earth receiving the least attention from the government? We have much to learn. As shrewd managers, we must turn our attention to more things than plowing and sowing. We want a better educated agricultural community—an education of mind and body that will counter-balance and overcome the false impressions made upon the minds of the people in regard to the actual standing of agriculture in comparison with other industries. We cannot, for an instant, believe that farming is, as many predict, doomed to sink into discredit because it can no longer be made profitable; that taxes are so high and legislation so unjust that the interest is ruined. But on the other hand we believe that the proper legislation will come in time and our interest will receive at the hands of the law-giving power that attention that its importance demands, and that the opportunity to purchase homes at half their value will be of short duration, and it will be the advance portion of this branch of the great industrial army that will reap the benefit.

WHAT SHALL I DO?

By HON. JOHN M. FOLLMER, *Milton, Pa.*

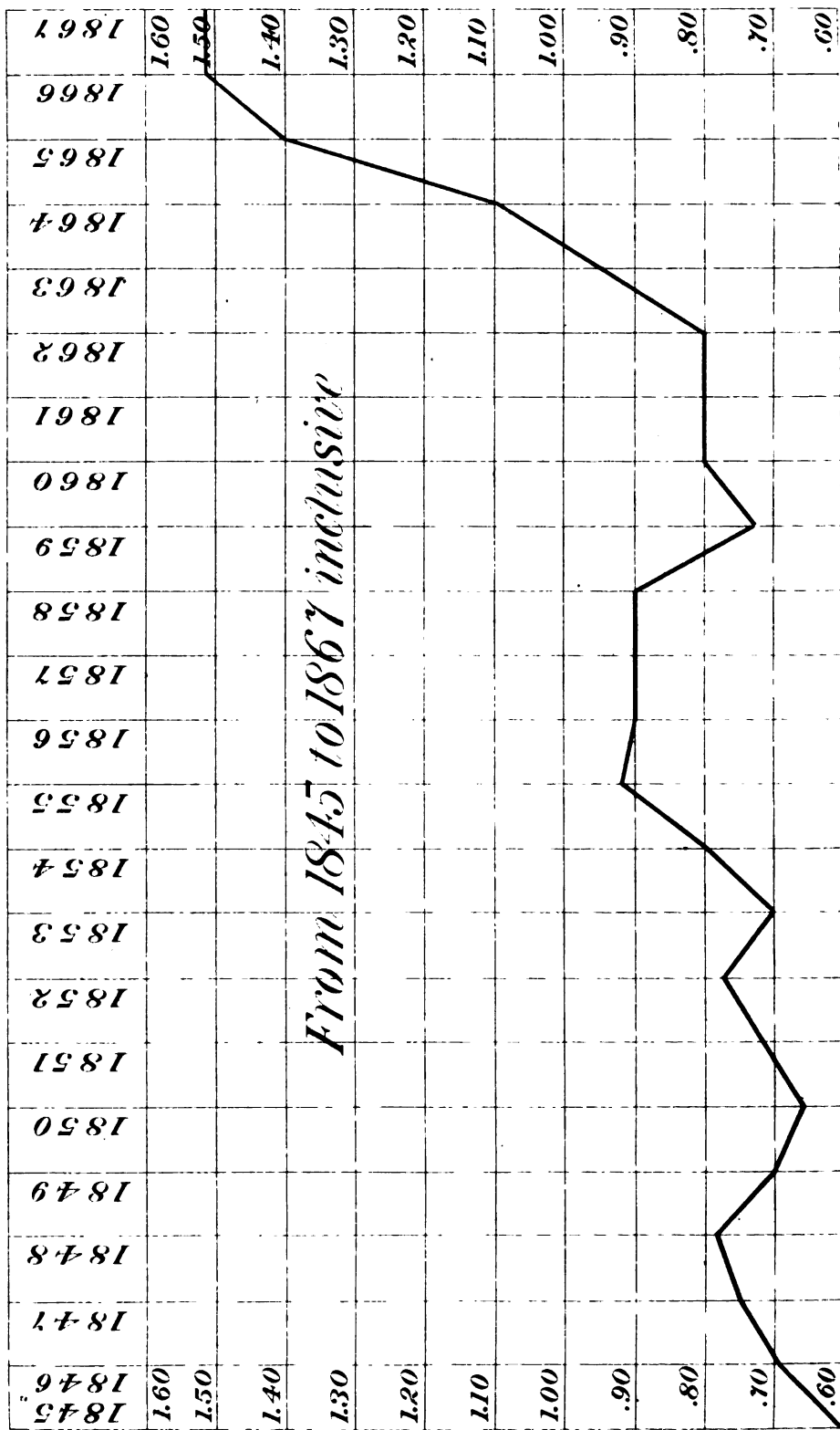
This, in the present depressed condition of farming, is a question of vital importance to the farmer—What shall I do to realize a fair income on my investment? to make farming pay? or, if you please, to make ends meet? That farming is more greatly depressed at present than it has ever been before, no one is prepared to deny, who is acquainted with the facts in the case. The same complaint comes from Pennsylvania, from the west and from the New England states. In New England, many of the farms are being abandoned; some will tell you this is caused in part by the west being peopled by New Englanders, others will tell you that it is caused mostly by the fact that farming no longer pays there. That the depreciation of farm lands in New England and elsewhere is caused largely by the cheap labor and the agricultural and horticultural products of foreign countries.

Others again will tell you that the Fifty-first Congress should pass, and the President sign, a tariff law that shall place a duty upon all of our agricultural and horticultural products equal to the difference in the price paid for labor in America and foreign countries, and it will restore the value of farm lands to their former price, and farmers will be remunerated for their labor. But while Congress is wrestling unsuccessfully with this plain problem, or worse yet, sheers off and lets it severely alone, what is the farmer to do meanwhile? Others again will tell us that this state of affairs is more owing to the immense amount of western land now being cultivated, and the cheap transportation to our eastern market. So you can very readily see that the question "What shall I do?" is far easier asked than answered. Therefore I would not be so presumptuous as to think for one moment that I can answer it, so I shall therefore only offer a few suggestions for thought and reflection rather than for adoption.

When Paul asked the question, "Lord what wouldst thou have me

do?" the question was promptly answered by an infallible authority, namely, by our Saviour, and Paul just as promptly complied with the answer, and with what eminent success, the whole Christian world knows. But the farmer has no one to appeal to in his straits. He has no infallible guide to whom he can put the question, "What should I do." If he had, and would receive an infallible reply, with what alacrity he would act upon it. But just here is the difficulty. Who then is to tell him what he should do. I venture the assertion that if you would put the question to one hundred of the most intelligent and practical farmers in Pennsylvania, you would get as many different answers; each one would be guided by the results of his own experience and judgment. However, there seems to be substantial agreement among farmers on one point. It is this: That under existing circumstances, what is known as "diversified farming," or trucking, brings the best returns.

By "diversified farming," I mean the raising of general and special crops and products, so far as the staple products of your farm is concerned find out what your farm is best adopted for, and then lay most stress upon that, but do not follow it to the exclusion of other products, which special products are also to be determined by the nature of the soil, and the location of your farm, and by the nature of your markets, as to what is most in demand. Dr. Levergood, of Womelsdorf, Berks county, has followed farming for many years, and is the owner of a dozen or more of the finest farms in that garden spot of the state, and he maintains, in an interview lately published in the *Philadelphia Times*, that farming still pays in spite of the depressed condition of the farming interests. His farms are best adapted to the raising of wheat, and wheat he raises at a profit, even at eighty-five cents a bushel, using no fertilizer but barn yard manure. At the same time each of his tenant farmers makes a specialty of one thing or another—hogs, sheep, cattle, fruit, bees, dairying, and so on as the case may be. But now do not do too much in this direction. Let each one be guided by three things—first, the nature of the soil; second, by the character of surrounding markets; third, by his own taste or fancy. Do not run counter to your taste or you will not only not succeed but most miserably fail. Then be sure not to select too many specialties or undertake too much and overdo the business and yourself too. In New York State and some parts of the west the farmers are raising sorghum with success and profit; whether it could be raised in Pennsylvania I do not know. But I should think it could, for our climatic conditions are just as favorable as those of New York and Kansas. But whether sorghum could be raised with success and profit or not, I am very sure that the German sugar beet could be successfully cultivated in eastern Pennsylvania, and as Claus Spreckels, the millionaire sugar king, has just put up extensive refineries in Philadelphia, and offers to furnish our farmers, free of charge, the seed, with printed directions how to cultivate them, and to buy all they can raise. I do not see why our eastern farmers, and especially those of Northumberland county, should not make a specialty of beet culture along with the raising of staple products of their farms. They could do so without much hard labor—yea as a recreation rather, amidst their severer duties and labors. The farmer of to-day should be an inventive genius and by management and strategic artifices overcome the difficulties that now confronts, him until through wise state and national legislation or some other fortunate circumstances, a better and brighter day begins to dawn upon



FARM WAGES BY THE DAY, WITH BOARD, NEAR PHILADELPHIA, FOR 46 YEARS. NO. 1.

him. Our state has done and is now doing much to answer the question, "What shall I do?" in establishing the State Board of Agriculture, farmers' institutes, the State College and Experimental farms. By the analysis of fertilizers alone it saves to the farmers of the state not less than \$300,000 every year; by suppressing contagious diseases among live stock, it saves our stock raisers a large amount of money annually. By the farmers' institutes, it does an immense amount of good to the farmers of the state. But if the state and national legislatures are to do more for the farmers than has been done, the farmer must also do more for himself, especially in the line of education, so that he may free himself more and more from the hands of designing men, act independently and for his own best interests. That the farmer does not need much education is a fallacy dangerous to himself and the nation. Pray, if the farming interest lies at the foundation of the nation's material prosperity, why should not the farmers be our best educated and most intelligent citizens? Monopolists would like to keep our farmers in ignorance, and exercise a tutelage over them, for they know full well that an educated farming community means the downfall of monopoly and the disenfranchisement of the farmer. Education is a sacred debt which the commonwealth owes to every one of her children and, as in the early colonial days of our country's history, the opening of the first grammar school was the opening of the first trench against monopoly in church and state, and the first row of pot-hooks which the little school boys and girls blotted across their copy books was the preamble to the Declaration of Independence, so to-day the education of farmers' boys and farmers' girls is the best weapon with which to combat the giant of monopoly which now has the farmer by the throat, lives on the sweat of his brow, and is fast sucking the life blood out of him.

Agriculture may with justice be placed at the head of all the arts, it certainly has the advantage of all others in antiquity and utility, and is in a manner the mother and nurse of the human race. It is the source of all solid wealth, it administers at once to our necessities and enjoyment, it is the principal revenue of the state, and supplies the defect of all others when they happen to fail. One reason of the small produce of lands is because agriculture is not looked upon as an art, that requires study, reflection and rules. The successful farmer requires as keen an intellect, as careful a training, and as much devotion and consecration to his calling as the wisest diplomat, the most learned doctor of divinity or the profoundest jurist upon the bench. The farmer of to-day is not the dull plodder of the past. If he would occupy the front rank, he is called upon to use his brains as well as his hands. He who now sows according to the changes of the moon will be outstripped in the race with the farmer of progress, who while working with his brain, throws the burden of muscular labor on the powerful sinews of his team and engine. The farmer of to-day must be a live man, bold in experiment, frank in conviction, and as free from prejudice as he would wish to be of the plague. In this spirit let him recognize the triumphs of genius in modern farm implements which offer to aid him in overcoming the toil of manual labor. But to utilize these to the greatest advantage, he must educate himself to their use--observation, patience and a little common prudence will be rewarded with perfect success, while the want of these will result in failure, and failure prompts its victims too rashly to condemn what is

in itself really a blessing. Progress is the watchword which seems by common consent to have been adopted, by the present generation and agriculture under its inspiration has made giant strides toward obtaining her niche in the grand temple of science. The present superior advantages possessed by the farmer over his predecessor of fifty years ago cannot fail to be greatly appreciated by every intelligent man. It may truly be said to have given a new zest and dignity to agriculture. Science has endowed us with the power of making the weak strong and the strong stronger, relieved the toil of other days, and at less cost of time and labor made two blades of grass to grow where only one grew before—yet, notwithstanding all these helps and advantages, the intelligent farmer will often pause to ask himself the all important question "What shall I do?"

WHY THE FARMER SHOULD BE A STUDENT OF ECONOMICS.

By PROF. ENOCH PERRINE, *Bucknell University, Lewisburg, Pa.*

It is no friction to say, that there was a time in the history of Agriculture in Pennsylvania, when the farmer needed but to tickle the earth with a hoe and she would laugh with a harvest. Then if the farmer had a strong muscle and a willing heart his success was assured. His sons had not yet left the old home, and the woods had not yet fallen from the hills, and the land was still as bountiful as a garden of the Lord. That day has passed. And what with the fact that land became somewhat exhausted and demanded help, the farmer was compelled to be a chemist. He studied chemistry, or was supplied with information by the various teachers of the subject with whom he came in contact, or by the numberless firms from whom he purchased his fertilizer. All farmers admit that to-day they must possess a knowledge of chemistry; and whether it comes to them at first or second hand, none the less it must be had.

And now the farmer has fallen upon still other times. In days of old his family was large and the boys remained upon the farm. Now his family is generally small and in large part the boys go away as soon as they can see any chance to do so. Then there was no trouble about getting labor; now the very same problem confronts the farmer on that side as confronts the largest manufacturer—how to get the work done, how to provide laborers. Then the capital involved was small, little beyond muscle and heart; now every farmer must employ much capital—he has become a capitalist—and on this side the very same problems confront him as confronts the largest capitalist. Then his harvest was sold and at good prices as soon as it was gathered, because competition was slight and his neighbors consumed whatever he produced; now he has to contend in production with the vast fields which lie to the west of him in his own country, and in price with the farmers of the whole world, whether they be on the water-courses of Brazil, in the flat-lands of India or along the steppes of Russia, and on this side the very same problem confronts him as confronts his neighbor, the manufacturer. Each advance in civilization has had its effect upon the farmer. To take no other—look at the effect of all the improved methods of communication, travel and transportation. These have added an enormous

and increasing annual increment of new farms in Australia, in Africa, in South America, in North America, all bidding for a rating in the same market, until to-day the merchant in Lombard street may, in the morning, consult his factors in Minneapolis, Montevideo, and Melbourne about some farm product, and in the afternoon order his supply from Cape Town to Bombay.

His occupation has now become a question of dollars and cents with the farmer, and he can no longer ignore the fact that a science has grown up which, if he will let it, will be as great a help to him as the science of chemistry has ever been. That science is the science of economics, which teaches concerning the production, the exchange, the distribution and the consumption of wealth. As really as any other man in the community the farmer is a producer, an exchanger, a distributor and a consumer of wealth. If there are certain principles which underlie all the forms of human effort, it stands the farmer in hand to know them and to square his life by them.

There has been at times a feeling of distrust on the part of the farmers with the science of economics. It was thought to have no word for the farmer; and that its principles were formulated by impractical theorists on the one hand or by keen but dishonest thinkers in the pay of the manufacturers on the other. Early in the history of the science the physiocrats of France did found their teaching on the basis that "land was the only source of income and agriculture alone was productive." It was seen, however, that this was too narrow a basis upon which to found a science, and as so often happens, those who wished to correct the mistake went to the other extreme. Adam Smith who dominated the science for a long time, taught that "labor is the *one* source of value and the *ultimate determinant* of prices." This system which seemed to leave the farmer's land so noticeably out of the account was distinguished for very many valuable principles; but it produced the impression that the farmer's contribution to economic life could be left to take care of itself, and that only the other departments needed looking after. Now how changed! The first topic discussed in most text-books is that of production and the farmer is really the greatest producer—and the first sub-topic here is that of land, with the principle of diminishing returns from land,—a principle which is seen to govern rent of almost every sort. Everywhere one can see the effect of the new way of thinking which puts the farmer at the basis of our social structure and is content to rest on his broad and strong shoulders. Notice of what interest to the farmer is the new theory of land-nationalization and single tax a theory which has by no means as yet been whistled down the wind. Will the time ever come when all land shall revert to the state, to be held for the benefit of all the children of God who made the land? If so, shall all the expenses of government be raised by a single tax upon land? In one form or another these principles underlie almost every theory which is proposed as a remedy for our social troubles. Who can have more interest in them than the farmer? They concern his property, and they must all be settled according to the principles which the Almighty has laid down for the government of the race.

One states the naked truth in saying that there is very much of unrest among the farmers all over our land, and especially so in Pennsylvania. President Stitzell, of the Berks County Agricultural Society said a few days ago: "It is quite out of the question to attempt to keep Pennsylvania's deplorable condition from the knowledge of the

world. Any man with half an eye, and whose wits are not hopelessly out of repair, knows that our agriculture has been stepping down hill with unremitting celerity in late years.

Senator Brown of York county says: "I will say that agriculture in Pennsylvania is at a low ebb; that none of the staple crops make a profit, nay, often do not make expenses; that things are growing worse instead of better. If things are at such a pass as your great paper, *The Country Gentleman*—says they are, that the farmer, even when he dresses as cheaply as possible, carries on his person in clothes the "cash value of a big steer, a good cow, and thirty bushels or more of corn and oats and potatoes," then it is utter nonsense for the farmer, as has been well said to act like the hard-pressed buffalo calf, which buries its nose in a tussock of grass, vainly supposing that its body is thus concealed from the hunter."

In trying to find out to what the farmers attribute their unfortunate situation, I have noticed that these are the four principal subjects of grievance, rightfully or wrongfully I do not now say, Competition, Taxation, Freight Discrimination and the Tariff. Every one of these is an economic question. They cannot be discussed or understood without a knowledge of those fundamental principles which govern the science of economics, principles which are as deeply rooted as is human nature itself. And just here will be the farmer's trouble. Men for their own selfish purposes will come to him with economic quackery and propose to him this and that line of economic action,—and if he has not been a student of this science, he will be hoodwinked by the talk of plausible men who have no difficulty in making the worst appear the better reason. Indeed they are now trying to do just that thing. It may be that many honest people are deluded thereby, and if so, more's the pity. Here is the man who tells you that there should be the free unlimited coinage of silver, and that if this can be brought about, the farmer will be all right. How so? Because if silver coinage is free, any one can take his bullion to the mint and there seventy-two cents worth of it will be made into a dollar. With this so-called dollar the farmer can pay off his mortgage in thus scaling the debt down about one-third, and all will be happy. But is the farmer dishonest? If his mortgage calls for dollars one hundred cents worth—isn't he dishonest if he forces his creditor to take pay in such depreciated currency? Moreover, nothing is more certain than such a depreciation, like the subsequent appreciation, which some time would be sure to follow, would really be to the relative benefit of the rich and to the injury of the men who work for a living.

The moneyed class can always best guard against and take advantage of any impending change; and when any form of currency begins to depreciate, that is the currency which is forced upon wage workers and which they are the least able to refuse.

If all this silver were put upon the people, the inevitable effect would be to drive better money out of circulation by a law as sure as that which keeps the needle to the pole. As soon as this is done, it will be found that prices of all kinds will rise in just the proportion that the silver is in excess of the wants of commerce. Then the farmer will see that after all he has not made much by his trick; for the increased cost of all he buys will fully balance all he made by paying his debts at seventy-two cents on the dollar. Common honesty will teach him this, and economics will prove it to him not only by the deductions of correct logic but by the hard facts of its history. But some will

honestly say: "If silver coinage is free, then the rich mines of the west will furnish sufficient money to carry all the surplus agricultural wealth produced beyond the Mississippi to the seaboard without a single dollar from the east." Why, there is enough money already in the country to transact the business. As has been well said:

"Since the resumption of specie payments in 1879 the currency in circulation among the United States has increased seventy-five per cent. while population has increased at not more than half that rate. In this period nearly all the products of the factory, field and mine have declined considerably in price; not merely in this market, but throughout the world. If all the silver of the mines of Colorado and Potosi should be coined into dollars no more could be used and circulated as money than would suffice for the business exchanges of the people. Nor could such a policy arrest the law of supply and demand so as to increase the price of silver or any other merchandise in the world's markets." Economics will tell the farmer all this, and he would thus be saved from plunging himself and his country into a slough of financial ruin.

There is the matter of COMPETITION. It is said that forty years ago labor cost just about one-half of what it does now, while the price for the farmer's grain has advanced "scarcely an iota." He can no longer contend with the rolling fields of the west, as is shown in the statement made that during the incumbency of the present sheriff of Berks county there have been more farms sold out than in twenty previous years. What is he to do? Obviously it will be of no use for him to go on in the same old way, sinking deeper and deeper into the mire. If he studies economics, he will find that it has to say to him pretty much the same as it has to say to the manufacturer. The market is governed—I do not say justly—by the never-varying law of supply and demand; and if the farmer does not keep in mind this law together with all that grows out of it, he will find himself very soon in embarrassed circumstances. So far as this law is concerned the factory and the farm are governed by the same principles. The farmer as well as everybody else must contrive to buy his raw material—whatever that may be—in the cheapest market, and sell the product in the dearest. He is no favored child for whom some special laws have been made by the Almighty. If he cannot succeed in his present line he must change to some other, just as the manufacturer. If he has tried all his resources and finds that he cannot withstand the competition he must do as everybody else, give up and move away. Economics will show this and he will be saved from sacrificing everything in the vain hope that better times are in store for him.

There is the matter of TAXATION. A question recently asked before one of your agricultural societies was: Why should our taxes increase in about the same ratio as our farms decrease in profit and selling value? It is stated in one county that in forty years the county tax has increased from fifteen to forty dollars and the other taxes in proportion. Now economics will tell the farmer that he, of all persons in the community, is interested in all tax questions; that while others may by various devices get rid of some portion of their taxes he cannot, because his land will not blow away, he cannot hide it under a bushel, he cannot transfer it to another without very much publicity, he cannot deceive as to its value for that is a matter of common information—in short he cannot avail himself of very many of those tricks by which his neighbors whose wealth is largely personal succeed in keeping back

very much of the tax which they ought in justice to pay. State and county expenses are increasing everywhere because the country is filling with people and their needs must be provided for. Asylums, jails and work-houses must be built, boards of various kinds must be supported and the farmers' land seems to be the one real tangible source from which to get the money to pay for these things. The Governor of a neighboring state has just said that their system of taxation was a system of real property taxation only; and what is worse, he alleged that "All attempts to extend the system to an equally comprehensive inclusion of personal property have been substantial failures," thus showing that somewhere is an influence at work to defeat any attempt which may be made to see that the farmer and the landowner are no longer unjustly burdened by paying the taxes of other people. Now economics will tell the farmer that there are certain fundamental principles according to which every tax should be laid—and common sense will tell him that if taxes are laid according to these principles, and honest men are at the helm, there will be no difficulty in the working out of them to the satisfaction of the people. Economics will tell him that taxes should be "(1) definite in amount and as to time and payment; (2) levied and collected in the way most convenient to payers; (3) made to take from the payer as little as possible beyond what reaches the treasury; (4) arranged to encourage, but not to discourage, industry, inventiveness, intelligence, taste, and whatever ennobles national life." It will tell him that if indirect taxes are levied, they should bear "lightly on necessities, moderately on comforts, more heavily on luxuries." Upon these four economic as well as moral principles the whole science of taxation is founded, and not until the farmer recognizes this fact and insists upon it at the polls will this part of his trouble be removed.

There is the matter of FREIGHT DISCRIMINATION. It is openly stated by your prominent leaders that you cannot compete with the west because the railroads discriminate against you in the matter of freights. That this is true is proved by the fact that the Inter-State Railway Commission appointed to cure, this among other evils, has detected the evil everywhere and in some cases has destroyed it. Now this, like the others, is an economic problem. It can be stated as an axiom that the price to be paid for transportation should be based upon the cost of transportation, taking all these terms in their broad sense. Hence, that transportation which entails the least cost should be furnished at the least price. This is a principle which the Almighty seems to have determined; one which can be seen working in all departments of human effort where economic forces have a freedom to work. And communities as a whole are to be treated in just the same way in which it is agreed individuals should be treated. It would not only be manifestly unjust—it would be economically unwise, to make distinctions between people living close together, because thus the free play of competition would be destroyed, values disturbed and the consumer injured. Just so when there is a discrimination against a whole state. It not only destroys the farmer by crowding him from a paying market, but the principle of discrimination once permitted will appear in other departments of effort and almost always to the detriment of the farmer. I quote to prove this from a recent report made on this subject by a committee of the board of trade of a rural borough of 18,000 population in the Schuylkill valley, who demand that the same discrimination

be given to them as is given to the manufactories of New England—a rebate of one dollar per ton on coal.

The committee state that it is owing to the unfair and exorbitant tax laid upon the mills and factories and furnaces of the Schuylkill valley that various industries are unprofitable, which otherwise could be profitably engaged in; that many of those which are now carried on are reducing rather than enlarging the amounts of fabrics they produce; that furnaces remain out of blast, and the fires of rolling-mills are not lighted up; that the home markets for agricultural products from the surrounding country, which might and would exist were industrial establishments prospering, do not exist; that their ore mines are unworked; that their natural advantages of proximity to supplies of fuel are made unavailable, and the capital, the enterprise, the energetic workmen, are compelled to seek employment elsewhere owing to the unfair tax on the coal they consume imposed on them by the railroads which traverse that naturally favored region.

If now, when a fair price has been established for transportation, the farmer sees that he cannot compete with his western neighbor, then economics will tell him that all attempts to supplant by legislation these essentially natural laws will be failures. It will tell him that he should look long and well at the problem, should be constantly on his guard, and be satisfied that his proximity to market should not avail him anything only after the fact has been proved beyond a doubt.

There is the matter of **TARIFF REFORM**. I am not here to advocate high tariff or low tariff or medium tariff. To do so would be to defeat my purpose. That purpose is to suggest that all these questions are essentially economic questions, and that the farmers, unless they become students of this science, will be very apt to be misled to their own damage by those who see this way to blind them. Lately this proposition was before one of your bodies "Tariff reform, or give to the farmers the same protection that others have. We must have fair play, as we are fast losing our farms." Admitting all this, one of your leaders proposes to increase the duties on wool, hemp, butter, cheese, wheat, oats, potatoes, beef, pork, and all other agricultural products, in order to give the farmers equal protection with the manufacturers, as the farmers are exporters of most of these products, how could the farmer be protected if the tariff were made as high as the moon? Moreover, if the farmer as well as everybody else, is protected, will anybody really be protected? It is an essential idea in the high protection theory, that some must stand to be sheared, and others take the fleece, in order that the high protection idea shall have any force at all? I do not say that such a high tariff would not accomplish the purpose; but I ask every farmer before he entertains the proposition seriously, to think for a moment, bring to bear some knowledge of economics and then if he decides that it will accomplish the purpose, stand up for it, in season and out of season. I ask the farmer if it be true that the only way in which he could be protected would be by bounties paid on exports, that if ten cents a bushel, for example, should be paid on every bushel of wheat exported from the country, the farmers might possibly add a part of that sum to the price of each bushel sold in the home market, that such a tax would not stand an hour, the protest against it would be so universal. The farmer is told that a high protective tariff, indirectly, though not directly, gives him protection also, since he shares in the general uplift given by it to trade and commerce. Let him follow through to their logical conclusion the very best, un-

biased, unpartisan statistics he can find on this matter and with his eye keen for his own advantage—for that is his duty—as well as keen for the advantage of others, let him make his decision and stand fearlessly upon it. The farmer is told that a high protective tariff will furnish him a home market for his goods. Let him inquire if with all the competition he is subjected to, the home markets are not becoming less and less able to absorb the constantly increasing surplus—let him see to it by hard logic and not by sentiment, if it be really true that—as some of our own leaders assert—about everything the farmer buys is protected and its cost increased while everything he sells is not protected, but rather is governed by the market-price of the world. On the other hand, he is told that the price of his grain is regulated from London where he competes with the world and that thus a tariff can do him no good. Let him weigh this statement and not take it upon faith. He is told that by a protective tariff men get a monopoly of the trade and that by trust-combinations they maintain the monopoly, to the detriment of the farmer and all others not in the “ring.” If the farmer wishes he can find out the truth of this statement. He is told that though wages appear to be cheaper in other countries and that thus if so the American manufacturer could not compete with foreigners, yet that wages are really not any cheaper, but in truth dearer, because the workmen are not so intelligent, so careful, so willing as the American, and that if this be so the American needs no protection, in other words, the farmer is asked to notice the difference between *real* and *nominal* wages. This he can readily do, and the solution, made in his own mind and from best helps thereto, would dignify him in his own eyes, make him a better citizen and enable him to think intelligently concerning his own interests. I have tried to present some of the arguments upon both sides of this widely-discussed question, and to suggest that there is a way which the farmer may take to reason correctly—that is by the study of economics.

Now the pity of it is that every one of these questions which are purely economic questions and should be decided upon the same principles by which all prudent men regulate their incomes and expenditures, must be taken to Congress or the legislature, and then this miserable matter of partisanship intrudes itself, and in the end if they are decided at all it will be with reference to the influence such a decision will have upon the next election. Let a really good proposition be made by either party—one founded upon a scientific basis—and there will be plenty of men in the opposite party who will fight it, merely because if passed it might afford some advantage to the side which proposed it. Master Rhone of the State Grange says: “No state in the Union is cursed with such vicious legislation upon the subject of taxation as Pennsylvania.” You know better than I just how much truth there is in this statement. True or false with reference to this state, it fairly represents the condition of affairs as found almost everywhere else, as shown in the fact that the question is engaging the attention of all leading thinkers in economics. Legislation seems so largely to be directed toward keeping one set in or getting another set in that there is little or no time or disposition to discuss these questions upon a real basis. I suppose that in a government like ours legislation must be had by means of parties; if we cannot do any better one might well hope that sometime men will divide legislation into two classes, one intended to “turn the rascals out or in,” I care not which, and let them stand as fierce partisans upon this if they wish

to; and the other intended to deal in a reasonable, scientific, unpartisan way with these really vital questions which have no more to do with "so-called politics" than General Washington's honesty has to do with his wife's portrait which has been put upon our one dollar silver certificate, a dollar worth somewhat less than a dollar.

To hasten this good time the farmer can do a very great deal by making himself a student of economics. Before all else, he should not get his information exclusively during the heat of a political campaign. Then strong passions are excited, reckless statements are made, untruths are sown broadcast, appeals to sentiment and side issues are made, so that he who depends upon this source for his information will have really little or no information worth the having. If he pins his faith to the coat of a political orator or editor, or to a voluble candidate for office, he will run great risk of being misled, for with all their apparent interest in the public welfare they are as apt to be looking out for their own interests as for his. Let him in the quietude of a winter evening and by his own fireside, bend to the task of mastering these principles. Let him say to himself: "I will get as far back toward original sources for the decision of these questions as I can; I will cast aside prejudice and partisanship and discuss economic questions solely from an economic standpoint, and then I will go whithersoever I am logically led." Let the farmer do this—and his life will be happier, his bank account will be bigger and we will hear fewer complaints that this most ancient and honorable branch of human industry no longer affords a decent, not to say reasonable, living to those who engage in it. Let him become master of General Walker's *Political Economy*—not a difficult thing for any man to do—then let him study carefully President Andrews' *Institutes of Economics*, then let him read the various articles prepared by specialists, and no man on any side whatever will be able to persuade him that good is evil and evil good, no will-o'-the-wisp will attract him, but firmly rooted and grounded in those laws of social well-being, as well established as those which hold the stars in their courses, he will make agriculture the most attractive as it was the first of human employments.

Economics will teach the farmer that he is so situated that he will have especial difficulty in getting his rights, and this should make him all the more anxious. For instance, it will show him just when a trust combination is an outrage upon him and just when it is not. It will teach him that while the manufacturers can combine to raise the price of their goods and limit production, because they are comparatively few in number and with interests which are somewhat identical, the farmer, on the other hand, has no such advantage. He numbers thousands upon thousands, scattered from icy Montana to balmy Texas, with interests which are by no means identical. Intelligence varies greatly with him, in some places high intelligence being developed, in others nothing much more than the faintest glimmerings of it. How can this mass be gotten together so that it may make itself felt? It cannot in any such way as the manufacturer or the trader can. Economics will tell him, too, that he will make a very great mistake if he thinks that legislation will cure all the evils from which he suffers, even though that legislation be enacted by the very best of men. Laws of Congress cannot abolish human stupidity and greed and deceit, they cannot touch many of the most terrible difficulties through which he has now to pass. They can do much, and they ought to be made to do more, but after all this is said there is personal upbuilding of character

which the farmer, as well as other people, must get, before his troubles will all of them disappear.

When I hear the word liberty rolled as such a sweet morsel under so many tongues in our country and then think of the difficulty we all have to surmount in getting any sort of competence for ourselves, just because of man-made shackles I marvel. But I remember that it has always been so and in other times much worse. In 1576 Peter Wentworth stood up in the British Parliament and made a speech for liberty which came near costing him his head. He said in that far distant day: "I have read in an old book, 'sweet is the name of liberty, but the thing itself a value beyond all inestimable value.' So much the more it behoveth us lest we, contenting ourselves with the sweetness of the name, lose and forgo the thing, being of the greatest value that can come unto this noble realm." I take heart because away back there he saw that liberty was but a name, and pointed to a still more remote day when the same state of affairs obtained. We certainly come nearer the real thing than any previous age has. But we are far enough off as it is; and in getting still nearer the fruition of our hopes, society needs the help of the farmer above all. Hence I read with no thrill of delight this statement which I see in all your agricultural papers, *The Decadence of Farming*. For I know that Goldsmith never wrote a truer line than when he said:

But a bold peasantry, their country's pride,
When once destroyed, can never be supplied.

I believe that a better day is surely coming; and for the hastening of it I know that the farmer, living a broader life, with deeper thought and wider intelligence, to which, among other things, the science of economics will contribute, that the farmer will add no small share, for without him our social structure could not stand a moment.

HOW TO MAKE THE FARM PAY.

By A. P. YOUNG, *Millville, Pa.*

The county records of any county in the country affords proof that farming as a business does not pay well.

Very many granaries if not all might appropriately have posted on them, sold at less than cost. Or that other startling announcement, bankrupt stock must be sold to make room for new goods.

The discontent of farmers with their calling is proof, that the reward obtained for labor on the farm is unsatisfactory. Men are not apt to carry mortgages on their homes at high interest if their business pays well.

The last census shows a large increase of tenant farmers. And the census now about to be taken will undoubtedly show that this business of tenant farming has been increasing with accelerated ratio. Farmers with capital to stock their farms and ability to manage them successfully are disheartened, are moving off to town, oftentimes leaving their farms in incompetent hands.

Investigators have discovered that the real estate of the country pays more than four-fifth of the taxes. Farmers own and cultivate much of

real estate, hence they feel the burdens of unjust taxation most. Farmers in Institutes, in the Grange in Farmers' clubs, the Alliance, the Wheel, and kindred organizations, east, west, north and south are entering emphatic protest against unjust division of profits, unfair and vicious manipulation of the earnings of labor.

The farming interest suffers as much from the competition of pauper labor as any other industry, hence if any branch of business is protected farming should have a fair share of protection.

As a preliminary to making the farm pay the corrupt legislation that makes possible unequal and unfair taxation should be corrected. Equality before the law, as regards taxation protection, will in the aggregate save large sums to the farmer. A penny saved is as good as a penny earned, hence in our search for means to make the farm pay these discriminations must not be overlooked. If the melancholy view of the state of agriculture were confined to a section it might be attributed to local causes. The fact that it is general, that the depression is shared by the whole farming, planting, and gardening interest is conclusive evidence that the cause is general and cannot be remedied by the farmer working as an individual. There is, however, many improvements within reach of every farmer that will help to make the farm pay.

No farm will pay well that is not fertile.

As well gather around an empty board miles away from any supplies of food, and expect a good dinner by sitting there as to put seed upon a barren soil and expect a crop. A miracle might furnish the dinner or the crop and as likely the one as the other. A crop is somewhat like an animal, give it just food enough to live and all the labor and care is lost. To enrich the soil, may be easy to those in reach of the proper fertilizing materials at low cost. But to the average farmer far from centers of population—no large town to draw from—it becomes the most difficult problem with which he has to contend. Plant food in available form in the surface of the field, that is in the stratum stirred by the plow and reached by the roots of the growing crops we must have if we would get pay for seed and labor of cultivation.

In connection with the discussion of this branch of the subject it may be well to state and remember one axiom. No man ever created a single atom of any one of the necessary elements of fertility. All of them that are in the world have been in the world since creation. And conversely all of them that ever were in the world are still here. They may have changed form innumerable times, been carried in the air from field to field, in the water, to assist in forming new lands or to fill up old ocean's bed. To-day may be in vegetable form, to-morrow animal or bird, now in one combination again another. The pasture eaten by the ox to day is flesh and blood to morrow, and destined to be plant food again in the near future.

According to historical data the shortest possible time that has elapsed since the earth took form is about six thousand years, while scientists make it a possible 600,000. The threescore years and ten of an old man's life is a very short time compared with the shortest period of the world's probable existence, vast changes take place in one lifetime. Fertile fields may be made barren in that time and barren fields by a different course may be made fertile. Every acre has been the scene of many and great changes since the world's history began to be recorded. A very large amount of plant food has been incorporated into different forms, has grown, decayed and been transformed into

other conditions many times over. These go on in an increasing round. Bad management or wrong manipulations may render them for the time being unavailable.

Available plant food consists of elements reduced to such a condition that water will take them up and carry them into the growing plant. A form of digestion takes place, the result of which is to build up the plant. Light, air, heat, moisture, are continually operating to effect changes. Every time it rains some fertilizing material which has since the last rain become available plant food is carried down into the earth, off into the streams with the continually sinking water beyond the reach of plant roots if none be there to take it up in passing.

Keep the field clothed with some crop would seem to be sound advice if you would retain fertility. There is however in nature a counter process a raising up of these same elements. If this were not so there would have been, ages ago, universal sterility of the soil. In proof of the fact that fertilizing elements carried down into the soil do, by a law of nature, come back to the surface, remove a building that has covered the soil a number of years, the spot will be found rich in plant food. The soil under a brush heap will be found to have gained in fertility if the heap has remained some time. Cover a spot with boards for ten years and though sterile when covered will be found fertile.

The moral here is have no fields lying barren nature arbors a naked field and makes an effort everywhere to cover the surface, witness old fields grown up to weeds and pines.

Fertility is lost in two ways, by washing out, and by being carried off by the wind after being liberated by the action of sun, rain and air.

The problem before the wide-awake farmer and he is the fellow who makes the farm pay, is to catch and hold the valuable elements in the surface soil until the plants are ready to take and use them. From a naked soil elements are continually dissipated by the sun's action and carried by the passing air currents to drop elsewhere in the rain and snow and to be gathered in the dew.

The shaded field loses much less in this way, there being much less evaporation from the soil. There is, deep down in the ground, much fertilizing material in store carried there by water out of decaying animal and vegetable matter. The air is laden with fertility and the passing breezes carry it to those fields where the surface or the crops are made ready for its reception and retention.

Our agriculturists lack in minute thoroughness in the various operations of fertilization, tillage, gathering and marketing. In this matter of painstaking carefulness sometimes necessary to success under adverse circumstances we may learn lessons from the Old World. The exceeding care with which the various processes are attended to by those who have been trained in very restricted quarters must be learned at least in a degree before the farm can be profitable to the extent of which it is capable. This lesson is gradually being learned through the adversity of such as forget the saying of Franklin that "always taking from the meal tub and never putting in soon comes to the bottom," "a stitch in time saves nine," etc.

Thoroughness is only another name for careful and intelligent attention to detail clear through to the end in whatever we may have in hand. Dash and enterprise sometimes dazzle us with their achievements but thorough application is the surest road to moderate, if not to phenomenal, success.

The baker may have at hand all the ingredients necessary to make a

light, sweet, palatable and nutritious loaf of bread but the elements must be mingled with exactness and all the processes watched with care or miserable failure will result.

Many farmers plow, harrow, fertilize and seed with no special thought except to get round with the different parts of the work along with their neighbors. This class depend much upon luck. A crop is sown, an animal purchased or raised, a process begun and the outcome trusted to luck, often ending in complete failure, when care and strict attention to detail would have insured a grand success.

Thorough draining, for much of our land must have this as a preliminary to being made fertile, is essential; no use plowing and wasting seed on wet ground. And very little use putting in stone drains except where there is a perpetual flow of water; mice and other vermin will get in and with nests and working close the water-way. Tillage cannot be thorough on wet ground. Some one is responsible for the saying "Tillage is manure."

Thorough tillage will do much to supplement fertility but never take the place of manure. A deep soil thoroughly pulverized so that capillary attraction can do best work at bringing up fertilizing materials from below is in proper condition that far. When in that condition it is ready too to take from the air penetrating it much that will be of use to the plant about to start. If you would have the farm pay, drainage of the wet spots must be attended to. If not drained they will be cultivated again and again and at a loss nearly every time.

To make the farm pay the farmer must be a many-sided man. He must have learned the trade so as to be thoroughly posted on the know how to do it, of every part of farm work. And not only should he know *how* to do it but he must know just *when* to do it.

The farm to be successfully managed must have in connection a veritable manufactory. Many of its products must be worked up into other farms before being put upon the market, that best results be reached and fertility retained.

Addition from the markets must be made to the food supplies that the food for every animal be a properly balanced ration. The waste materials must be cared for, properly mingled and kept for application at the right time. To make the farm pay the farmer must have tools and know how to handle them. Many times serious loss occurs waiting for the repair of a break, that if tools were at hand could be mended on the spot and work go on, saving expense, saving time. Besides knowing his own trade thoroughly and being mechanic enough to keep in order or repair his own tools, and in these days of complicated farm machinery this is no mean acquisition in mechanics, he should know enough of chemistry to properly compound feed stuffs and adopt them to the different animals to be fed as well as to take intelligent care of all his waste products and work them into manure without any loss of their valuable constituents. He should know enough of botany to distinguish among plants those he should encourage to grow and those he should destroy as pestiferous, carefully noting the habits of growth and means of propagation. He should know something of entomology, so as to be able to distinguish friend from foe in this department. All this and much more the farmer of to-day needs to know if he would be successful. But says some one this is too much for the farmer getting on in life. It may be too late for him, but from feeling the need of much more varied knowledge than he has at command should make

him exceedingly anxious that the boy whose education he is superintending should be better equipped.

If he cannot go to school for a thorough education give him a special course in agriculture. If this cannot be done supply him with books and papers devoted to the calling. With these at command, if he has a taste for the duties of the farm, an interest in its affairs he will succeed working out for himself from the journal or book and the field, the one supplementing and corroborating the other a grand success may be achieved in any calling.

The agricultural papers of the day conducted as many of them are by specialists in the different fields embody the investigations, opinions and conclusions of these specialists. The market reports in them, when fairly made, up are often very valuable, enabling the farmer to calculate intelligently upon probabilities and hence they are important adjuncts in making the farm pay. Again often leisure time or time that otherwise might be spent in listening to idle stories at the nearest lounging place would be improved if something interesting were at hand to read. *Give the boy a chance.*

There are many things in reach of the middle aged or even old man that might help to make the farm pay. Are your buildings, stables, pens, and poultry roost in good condition, warm and comfortable and are they so arranged that no loss of manure takes place? If not why not? Remember that exposing animals, especially young animals, to storm and cold, with the idea of toughening, thus making them more hardy is about as suitable as the boy's experiment in tying his pup to the northwest corner of the barn when the thermometer was below zero, for the purpose of hardening it. In the morning he found it very hard. All suffering imposed on young animals is a direct loss, besides a draft upon their constitutional vitality and future growth and usefulness.

Grade up your stock horses, cattle, sheep, pigs, and poultry. Build a silo to preserve green fodder, especially your corn crop, saving much work and enabling you to keep many more animals on the same area. Seed well when sowing to grass. Put on clover thick, early and often. If your land will not hold it find out why and apply the remedy.

Also grade up your farm crops by selecting the earliest, hardiest and best for seed. Get out of the rut of old customs and see to it that nothing goes to waste. Remember that the condition of food has much to do with its value. It must be in digestible form. Again a single food may enable an animal to live, but for health growth, vigor and the best results a variety must be supplied. To simply sustain life is not the aim of the intelligent farmer in feeding. Muscle, meat, eggs, dairy products is the end aimed at. It is not more brain but more use of brain that is needed on the farm to make it pay.

FARM DRAINAGE.

By A. Z. SCHOCK, *Bloomsburg, Pa.*

This important subject to agriculturists presents so many points for consideration, that necessary brevity obliges me to confine myself to a few suggestions, opinions, and well-established facts which I have obtained, partly from my own experience, but largely from the works

of eminent engineers and experimenters on the subject, from whom I have obtained ideas and frequently quote.

Drainage, we are told, is as old as the Deluge. From the time Noah watched "the subsiding of the waters" to the present day, husbandmen have been constantly annoyed and frequently baffled by too much water in the soil, and have endeavored to remove it in various ways.

The Roman writers on agriculture give us the first authentic accounts on the subject, mentioning the advantages arising from it, and in some cases, minutely detailing and giving directions for doing the work.

We have, however, no record of thorough, systematic work having been done before the seventeenth century, when Bligh of England published a valuable work in which he strongly advocated the theory of deep drainage, which method has many followers at the present day. Since that time, a better knowledge of its importance and advantages has developed, and its wider practical application has grown from day to day. Now our most successful cultivators declare its necessity, where nature has not kindly done the work.

We all know that it is impossible to raise a good crop of grain on wet land, or on fields where pools of water become sheets of ice in winter. In such cases the plants are frozen out, the greater proportion perishing, while the roots of the few that may survive, still clinging to the soil, are unable to sufficiently nourish the plant, so that, if any mature, they will produce but a small yield of inferior quality.

Stagnant water, whether on the surface of the soil or within reach of the roots, is always very injurious if not entirely destructive to the plant. Too much cold water is usually the real cause of crop failures which are attributed to unfavorable seasons. We frequently hear complaints like these, "My wheat was frozen out;" another, "The season was too wet for my land," or, "I had to plow my land too wet, and it became too hard to cultivate properly;" and again, "My corn rotted in the ground because of too much rain;" still another, "My crop was injured by the frost, because my field was too wet to plow in season." These and similar complaints would seldom be heard if all land were properly drained. In fact, there are few seasons too wet, cold, or dry that are the cause of poor crops on drained land, well cultivated.

Drainage is as sure a remedy for drought as for flood. Improbable as this statement may appear, it is nevertheless a fact which is thus explained. Fine pulverized or open soil is capable of holding a large quantity of water in suspension, retaining it in the minute particles of earth without saturating it and thereby excluding the air. Some soils will, in this manner retain nearly one-half their own bulk of water. If the particles of earth are compactly pressed together, there is no space for water. This is the condition in which wet soil is almost invariably found during a drought. It is solid and hard. Drained land does not become compact by saturation, but remains open and porous, and in this state is enabled to retain not only the natural quantity of rainfall, but in addition, the soil now absorbs from the air, which can now permeate it, a large quantity of the moisture it always carries with it.

By a wise provision of nature, the warmer the atmosphere the greater its capacity to hold moisture. "The heated air over our fields and streams, in summer, is loaded with moisture as the sun declines. The earth has been cooled by radiation of its heat, and by constant evaporation through the day. By contact with the cooler soil, the air, borne by its thousand currents gently along its surface, is condensed and yields its moisture to the thirsty earth again, in the form of dew."

This dew is not only deposited on the surface, but also in the soil where the air penetrates.

Drained fields can also be cultivated much earlier than others. This fact with its accompanying advantages all will admit. The growth of the crop is quickened by an increase in the temperature of the soil. This will be readily understood when we remember that on land not naturally drained, the thirty-eight inches or more of water annually falling must be removed largely and slowly by evaporation. The process of evaporation absorbs or renders latent the heat so necessary to the growth of the plant. This loss of heat, particularly in the spring, is a serious injury, aside from the fact that very few plants will grow at all in saturated soil. Scientists teach that every gallon of water so absorbed by evaporation requires and actually carries off as much heat as would raise five and one-half gallons of water from the freezing to the boiling point.

Another crowning advantage of which we avail ourselves in well drained soil, is the source of fertility from rain, not only in supplying the necessary moisture for plant growth and in dissolving the various elements of fertility already in the soil, but also because it contains and brings with it from the atmosphere valuable fertilizing substances. Mr. Laird, in "The Cyclopedia of Agriculture," says, "By the recent discovery of Mr. Barrell, rain water contains within itself and conveys into the soil fertilizing substances of the utmost importance, equivalent, in a fall of rain of twenty-four inches per annum, to the quantity of ammonia contained in two hundred pounds of Peruvian guano, with one hundred and fifty pounds of nitrogenous matter, besides, all suited to the nutrition of our crops." Our average rainfall is more than one-half greater than here stated, and the benefits are therefore proportionally greater. Admitting the truth of this discovery, it is not presumed that all these elements can be extracted and retained by the soil, but should only a reasonable proportion be secured, it shows the importance of having our land in such condition that the rain water can pass through it, filter out these treasures and discharge the surplus water through drains.

But this is not all. "Rain water also contains, in solution, air, carbonic acid and ammonia. The first two ingredients are among the most powerful disintegrators of a soil. The oxygen of the air and the carbonic acid being both in a highly condensed form, by being dissolved possess very powerful affinities for the ingredients of the soil. The oxygen attacks and oxydizes the iron; the carbonic acid, seizing the lime, potash and other alkaline ingredients of the soil, produce a further disintegration, and renders available the locked-up ingredients of this magazine of nutriment. Before these can be used by the plants, they must be rendered soluble, and this is only affected by the fire and renewed access of rain and air. The ready passage of both these, therefore, enables the soil to yield up its concealed nutriment."

Fertilizing elements are also carried into the soil by air, from the breathing of all living things, from decomposing animals and vegetables, from combustion, and from many other causes. These are lost to compact soil through which the air cannot penetrate.

What lands then should be drained? The usual answer would be—swamps, bogs, or any lands too wet to be properly cultivated in season.

Drainage has been defined, "The art of rendering land not only so free from moisture that no superfluous water shall remain in it, but that no superfluous water shall remain in it so long as to injure, or even

retard the healthy growth of plants required for the use of man and beast." This is a plain common sense definition, but may be too broad to be generally practiced. The question to be decided is, "What lands will it pay to drain?" and that must be determined by the value of the land before and after, and the cost of doing the work. I wish to carry this principle only so far as I have it to be practicable to every farmer.

Most of our farms have spots of various areas that need drainage, many of which are worthless without it. In many cases, these places are the best soil on the farm. Some cannot be cultivated, others may be at times, but the labor bestowed is poorly rewarded. Taxes must also be paid on acreage that brings no income. In cases where an outlet can be had without extraordinary expense, such fields can be drained at a cost of a small per cent. of the average value of the land per acre, and will then not only produce the best crops, but will also remove an eyesore from the farm.

Having determined to drain, the proper location of the ditches is the first important matter to be decided. This requires intelligent and careful thought; and where the necessary experience or judgment are wanting, or any considerable work is necessary, I would strongly recommend the employment of a competent engineer, or some person with experience in the work. Conditions vary so greatly that no general rules can be laid down that will meet all cases. A few limits only will be attempted.

Try to ascertain the source of the water and cut it off as near the head as possible. Springs that do not show in a pool on the surface, but ooze from the ground over a more or less extended area, injuring acres below, can frequently be reached and cut off by a single drain.

The locations of the drains suggest themselves in most ponds. Where the pond is simply a reservoir of surface water, or is fed by springs near its lowest point, a drain of sufficient capacity, reaching that point, is often effectual. Should this main drain while still open, fail to lower the water to its level, it is evident that the water comes from a higher source, entering the pond around its banks. These points must be reached by smaller drains connecting with the main outlet.

In stiff clays and very wet spots, parallel drains from thirty to sixty feet apart, as the condition may require, are usually made. Put the drain across the top of a slope, where the water first makes its appearance. This will drain to a point below at least on a level with the bottom of the drain. The process must be repeated with parallel drains if water again appears below the drain above.

In valleys it is not always proper to put the drain at the lowest point, in fact, I may say it is seldom so, because, in most cases, the source is at a higher point, and the water finds its way to the lowest level on the surface.

It is generally necessary for effectual work, in such places, to put drains on both sides of the lowest part, sufficiently deep that the bottoms of the drains are below that point.

The direction of the drains should generally be in the line of greatest fall or quickest descent, and in straight lines as exactly as nearly possible. Avoid curves. They are seldom necessary and are much more difficult to grade.

Never guess at the grades, except where the fall is extraordinary. Great annoyances from stopping up, or imperfect results are avoided by care in grading. If no engineer is employed, and having no engineer's

level, an ordinary carpenter's spirit level, fixed to a staff so as to be adjustable, and on both ends of which small projections are placed to answer as sights, will be all that is necessary to ascertain the variations of the surface and grade to drains.

In grading I use the following method which I find entirely satisfactory. Drive stakes along the line of the ditch at intervals of about twenty feet. Beginning at the outlet, cut a notch for a grade mark on the first stake placed there, at a point three or more feet above the bottom of the proposed drain. Place the level over the stake. As the level will necessarily be above the grade mark, a rod will be required with a movable target so adjusted that when the bottom of the rod, held in a perpendicular position, touches the mark, the center of the target will be even with the level sights. For this purpose, a simple wooden rod, a small piece of white paper or card board for a target, and a tack to hold it, will be sufficient. Whenever the contour of the ground will permit, or the fall is slight, or the drain is short, maintain a uniform grade in the bottom of the drain throughout the whole length. Establish the grade with the last stake at the upper end of the line. On this stake also cut a grade point the same distance from the bottom of the drain as on the first stake. Have an assistant hold the rod with the target carefully adjusted as already explained, to the grade mark on this stake, then adjust the level, by means of the sights, accurately with the target, and allow the level to remain in that position, while the rodman moves from stake to stake toward the level, fixing the grade mark on each one by moving the rod up or down at the direction of the level, until the target strikes the sight line when he marks the point at the foot of the rod.

When the ground is so uneven that to maintain an even grade throughout would be too expensive, or when the direction of the ditch is changed, the grade may be varied. To accomplish this, the method described must be carried out on each section of the drain, that is by first fixing the grade with the farthest stake up the line that the lay of the land will permit, or to where the drain changes its course, then having marked the intermediate stakes, move the level up to the last stake marked. Fix the grade for the section above in the same manner, and continue to do so from section to section till the end of the drain is reached. This may give a different grade to each section, but the fault is not serious if the grade is sufficient to permit a full flow of water.

Having the stakes properly marked, beginning at the outlet, stretch, from stake to stake, at the marked points, a light cord drawn so tightly that there will be no sag. This line gives the exact grade of the ditch as it should be three or four feet below.

Make a wooden square with the longer arm the length of the distance from the line to the bottom of the proposed ditch, and the shorter one about twenty inches long. Dig the ditch beside this line to a depth which will be reached, when, by placing the square in the ditch with the long arm perpendicular, the short arm touches the cord. This method prevents sags or depressions in the drain, which are to be avoided, as they are particularly objectionable where tiles are used, and where the fall is not great. It has another great advantage of having the stakes and line by the side of the ditch, thus being out of the way of the workmen. I find it most convenient to have the line at an average of about one foot above the ground. If, then, a three foot drain is wanted, the long arm of the square must be four feet in length.

It will be necessary to vary the length of the long arm where the surface is very irregular, or when a greater depth of drain is desired.

This brings us to consider the depth of the drain which is a very important matter. Various opinions upon this point have been and are still entertained, but this general principle has now been well established, "that depth will compensate for with, that is, the deeper the drain, the farther it will draw," and therefore the fewer will be necessary. This principle can be disputed in peculiar clays only, where frequent drains are sometimes necessary. The majority of engineers, I believe, now recommend three to four feet as the proper average depth. There are, however, cases where a quarter depth is required by true economy. I believe three feet to be the average economic depth in this section, and in my experience, it has proved very satisfactory. Much depends upon the character of the ground, and the consequent cost of trenching, however they should, if possible, be under the frost line.

And now comes the question concerning the materials to be used, and the construction of the drains. In this section, nothing but stones or drain tiles are permissible. Where stones are close at hand, lying over the fields, from which in any event they should be removed, true economy dictates their use. Stone drains are very efficient when kept open, but are more liable to close up than tiles carefully laid.

When using stones, I make the ditch about fifteen inches wide at the bottom. I select stones of a thickness, as even as possible, place them on both sides of the bottom upon which large stones (flat preferred) are placed, leaving an open water way four to six inches square. Then fill in the largest stones first, carefully staying the side and top stones to keep them in place, and top out with the small stones, till within about fifteen inches from the surface.

Where stones well adapted in size and form cannot be obtained near by, the use of tiles is advisable. The time is coming rapidly when their efficacy and general advantages will be better understood among farmers, and their use will become more extensive. They have many advantages to recommend them. The trench may be made much narrower, and is therefore less expensive. Twenty rods of tiles may be laid as quickly as one of stones, and they are much less liable to close up. Their cost, in many cases, is no greater than the expense of teaming, when stones are used.

Too much care cannot be taken in laying them. A little carelessness at any one point may seriously affect their working, while with proper care, they will do the work well, and will continue to do so for many years. Tile drains laid in England, over one hundred years ago, are said to be still in good order. They should be placed together evenly, the joints being covered with a little sod, grass side down, to prevent sand or fine soil from running in before the ground has settled. If the soil is stiff clay, fill in a trifle over the top of the tile with top loam or loose soil, which, being more porous, will enable the water to enter the tile more readily.

Two inches is the size of tile generally used, and, with a reasonable grade, will discharge a large quantity of water. Larger sizes are often necessary in very wet spots or bogs, and should always be used for into mains which a number of smaller drains are conducted, thus avoiding too many outlets into open water ways. Few outlets are preferable because the drains are more liable to become choked up or

obstructed at this point than at any other, by the growth of weeds, tramping of cattle, or deposits in the open ditch

The outlets should be looked after carefully from time to time, and if kept well open, the drains will do their work faithfully, to the lasting gratification of the owner and constant benefit to the land.

EXPERIMENTS IN FARMING.

By H. G. RUSH, *West Willow, Lancaster county, Pa.*

The subject assigned to me had better been treated by some one whose attention is devoted to experimental farming, and trust that after my few remarks which will be more negative than affirmative some one will tell of the benefits, the pleasure and the profit of experiments.

It is popular nowadays to introduce a subject by something entirely foreign to it, I invite your attention to the rank of agriculture among the various vocations. The mottoes of our agricultural journals and the flatteries of political demagogues would lead you to suppose that farming is the first and most dignified of all vocations. First in that it provides the necessities of life without which the startling developments of our day were impossible. First in political importance in that it represents the majority of mankind. First in social significance in that it affords the best development and the best protection of the family, if not also first in stimulating to religious duty.

Theoretically agriculture deserves to be called the foundation of civilization. Position however does not always determine superiority. While the foundation must always be first in the order of time it is often its lot to lie helpless and groaning under the weight of an abusive superstructure. The ambition of the pugilist is not to be a foundation but rather to be on top, and when we look at how the poor farmer is victimized by the encroachments of railroads, monopolies and minority legislation we have great reason to fear that instead of *underlying* all other industries we are *lying under* the weight of merciless oppression. If the latter, if it be so that the farmer has failed to attain his true position in the body politic, it is but the result of his own indifference to organization. He has entrusted his substance to the care of unjust stewards, and has ignored the doctrine of self-preservation.

The utility of experiment depends upon the same argument of defense as the utility of discovery and invention. Imitation and deviation embrace the whole catalogue of human activity.

By imitation the best ideas or at least those which meet with popular favor are adopted in the various vocations giving rise to the sameness which we see in any department. For instance we at once recognize a carpenter's shop, a furnace, an engine or an apothecary shop by its likeness to others of the same sort. This result of imitation on the farm is noticeable in buildings in fences in machinery as well as in the arrangement of fields and the rotation and proportion of crops.

While however we are inclined to make use of the best known means to a given end we have an innate feeling that the best methods and the highest ends have not yet been discovered. This unrest which does not even wait for the pressure of necessity gives rise to experiment, the fruit

of which can only be measured by comparison of savage habits with modern mechanism. Imitation and experiment have each a large claim in the economy of industry. Imitation assures the preservation of the best known, while experiment breaks to pieces with a view to construct something better. Imitation gives us unity. Experiment gives variety. Unity in variety is one of the highest laws of perfection, whence we take the liberty to assert that unity in variety is the result of imitation and experiment is the chief characteristic of a grand civilization.

Progress is the watchword of this nervous age. Progress in farming as progress in any other sphere depends upon experiment and it would seem proper that every one should experiment in order to hasten development. That kind of experimenting which seeks for better and cheaper methods of doing work without interfering with work deserves universal encouragement, but of that other kind who are constantly trying to find out something new and thereby neglecting present opportunities I would say that one in a thousand are too many of such experimenters.

Success in life, whether it be as mechanic, trader or producer, must be sought, with very rare exception, in pursuing a defined course by adopting wisely from means already at command. More failures are attributable to the habit of trying of this a little and that a little than to any other one cause. There is an initiation period to every undertaking. There is a slippery pole to climb for those who would win a place in the business as well as for those who would share the benefits of a secret society. Success is rarely, I will say *never*, met at the threshold. Modest expectation and persistent application are highly important equipments for a beginner. How often we see people manifesting their disgust of an undertaking before they have fairly tried. One venture of a kind satisfies them there is nothing in it. One year it is potatoes, another tobacco and finally some side issue, like dealing in hogs or running for office.

Speaking of farming as an industry we wish to be understood that alone is successful farming wherein the ends will pay for the means. Not that every little venture must be paid in its own outcome but that the operations as a whole should be regulated by the profits of the business. Though one may succeed in outranking all competitors in the fruitfulness of his soil, in the tidiness of surrounding and the proportion of improvements, if these are brought about and maintained by resorting to funds not likely to be repaid in farming, his example is not worthy of imitation except by those who have plenty of money to spend and wish to resort to farming as a fine art. As well may you follow the example of a storekeeper who, for the sake of trade, resorts to the most elaborate decoration and sells below cost. Experiments conducted with reference to wide departures or accurate scientific determinations are tedious and expensive as the labors of state department of agriculture will show. The average farmer cannot afford to undertake such experiments, more than the average mechanic can afford to seek an invention.

Every farmer in the management of his affairs can exercise his faculties in getting the best, cheapest and most expeditious results from men and machinery.

A dollar saved in the cultivation of an acre, a dollar saved housing of a crop, a dollar saved in preparing for market, supposing the work as well done, gives to one a decided advantage in this period of low

prices. In the sense of seeking the best use of what is at command I would encourage every farmer to experiment. In the sense of trying entirely new things I would say you can scarcely be too cautious. The tendency to get away from established customs needs rather to be checked than encouraged. We are a fast people.

The object aimed at in experiments may be a threefold: First, better facilities for doing a given work: second, larger returns for a given amount of energy, and, third new discovery. The first and second of these demand the attention of every wide-awake farmer. The third, that of new discovery, is not the concern of the masses.

The outcome of improved machinery and intelligent management is increased production and consequent low prices, farmers would by no means be willing to submit to the old methods of doing their work, but as a matter of profit it is a serious question whether the introduction of modern machinery has not made it more difficult to make money. There is no doubt in my mind, but that the consumer of agricultural products is more decidedly favored than the producer. The glutted condition of our markets creates a sort of disrespect for the saying of the sage "that he who causes two blades of grass to grow where one grew before is a benefactor." Grasshoppers, drouth and the various other forms of devastation, so long as they are confined to the other fellow, inspire us with better hope than the report of gorged elevators abroad.

And what is the farmer doing to overcome the difficulty? Why, in spite of the fact of over-production, or under consumption, which is the same thing, he is trying his level best to grow sixty bushels of wheat per acre instead of thirty; trying to raise one thousand bushels of potatoes, when he can't find market for two hundred.

He would fatten a steer with a bushel of corn if he could, while it would be better for the market of corn and beef if it took five hundred bushels to prepare a bullock for the shambles. But then his actions are no more absurd than those of the doctors (I mean the old school), who thought the best way to insure recovery was to make you *right sick*. No doubt they thought you would be all the more grateful for your recovery and the more willing to pay what would otherwise appear an extortionate bill. Our mothers used to tell us when butter was cheap to spread it thin as it took so much more to pay the grocer's bill. Eggs, for the same reason, must be sold in the summer and in winter they must be sold because there are so few.

A word concerning the origin or paternity of invention. We are told that necessity is the mother of invention. Unable to prove the birth what are the evidences. Experiments and invention belong chiefly to civilization, hence if we accept necessity as the parent we are forced to the conclusion that civilization creates necessities. That civilization creates wants or desires is not doubted, but they are not well named as necessities. We might as well say that knowledge creates ignorance as that the supplying of wants creates wants.

Of course this contradiction of terms may be excused as paradoxical. It being true that the more we know the more we don't know, it may with equal propriety be said the more we have the more we don't have. A simple statement is that civilization which embraces education opens the way to new possibilities.

There are two worlds the world within and the world without, harmoniously correlated, the world without inviting the activity of the world within. The mental activity which it appears to me has most

to do with experiment and invention is curiosity, that innate desire to know, to see and to try. Curiosity both meets with difficulties and finds a way to overcome them. Necessity it seems to me is but a distant relative to invention the true mother being curiosity the daughter of Lucifer, and the grandchild of pride.

Finally, that agriculture regulates the pulsation of national industry is invariably conceded. That the claims of the farmer have been seriously abused by adverse legislation none can disprove, and there is no prospect better in store, till we awaken to the fact that so far as the interest of the farmer depends on legislation it can only be hoped for under closer organization with the view of asserting our proper place in the body politic. Would you have your calling more pleasant, would you make it more inviting to your sons and daughters, and would you prove the importance of educating farmers, then, my brothers, rise and assert yourselves by putting the care of your calling into the hands of your own people. Would you have the smile of prosperity to revisit your homes, try the experiment of farm representation for a farming people.

PRACTICAL VERSUS BOOK FARMING.

By H. W. NORTHRUP, *Glenburn, Pa.*

(Read at the Benton Institute.)

What we understand by practical farming, is the successful farming which we practice. The knowledge of which has come to us by satisfactory and practical tests. Our mistakes in farming are by no means practical, though we sometimes injudiciously repeat them.

Book farming is a theory that some person or persons have devised and presented, as a guide to the business of the tiller of the soil. It may be excellent, and if carried out accomplish the object in view. On the other hand it may be fallible and lead to erroneous conclusions and final defeat. The only redress under such circumstances, is to accept the disappointment, and then endeavor to shun the rut that has thwarted our purpose. A practical man in the general sense of the term, implies a successful man. He is thoughtful in his methods, and seldom jumps at conclusions. These are the men in our country today who are moving in the first ranks of prosperity. Practical knowledge, and that terminating in success is of vital importance to the patient husbandman at this time and in this age. As farmers we are desirous of obtaining the best information, and then applying it to the development of our productions. This information comes to us in a variegated form. It appears like the wheat that is mingled with tares. We are unable to separate until the time of harvest. We have no means of knowing that the plan or purpose will succeed, until we have given it a practical test. So the knowledge, good or bad, comes to us in like manner. Our aim should be, to receive and cherish the good and to cast the bad away. We cannot think that our advisers are guilty of deception, or disposed in any way to lead us astray. Our location, and climatic influences many times may be traced as the chief cause of failure. That which may be a grand success in one section of our country might be almost a total failure in another. Certain

cereals in the extreme southern part of Pennsylvania may be grown with complete success. But you remove them at once to the northern extremity and they will be abandoned as unprofitable. Pennsylvania, for the most part, is considered a fine corn growing state: while New York, lying just above its northern border, with cool nights, and shorter seasons, is poorly adapted to the purpose. The same is true with fruits and vines. In the lower part of our state, I am told that the Baldwin apple matures early, and is only grown as a fall or autumn variety, while in northeastern Pennsylvania, it grows luxuriously; is a chief standard winter variety, and one of the best keepers in the whole catalogue. Not only location, but the condition and constituents of the soil, effect the plant. The agent with his commercial fertilizers, honest in his intentions undoubtedly, comes to the farmer and encourages him to purchase his staple commodity, assuring him that if he applies it according to the directions set forth in a printed manual he will reap an abundant harvest. In one respect this is true in another it is not. If the condition of the soil is such as to possess a certain amount of moisture and heat, it will furnish food and the plant will thrive. Otherwise it will not.

This fertilizer or any other is of no avail to the plant, unless it comes in contact with moisture, and in a dissolved liquid form is taken up through the fibrous roots causing development. Thus we see that we cannot always justly charge our failures and misfortunes to our book information. There are other uncontrollable causes working against us, and we can only strive to overcome them to the best of our ability. Another source of uncertainty with us is that the authors of our agricultural literature do not agree or harmonize in their methods. One will highly recommend the plowing of the orchard. Stating that the surface roots thus broken will be replaced by a new growth of fibers, and the trees by this process will become invigorated. His literary brother tells us that the plowing of the orchard is all wrong, that the surface roots are the chief feeders to support the tree, and to cut them off with the plow will certainly hasten decay. The former friend will tell us that fall plowing, all things considered, is the most desirable. The action of the frost will then pulverize the soil, and all destructive worms and insects will be turned near the surface to perish with exposure. His twin brother says spring is the proper time to do the plowing. You will then pulverize the soil and it will remain in this condition, not having been made compact by the early and heavy spring rains, and you will get a larger yield in your production. It is said

"The lawyer leads a harrassed life, much like the hunted otter.
Between his own and other's strife, he's always in hot water."

I would like to know if it isn't about the same way with the farmer, while he looks for information from his literary friends. But the fact that these things are so does not disturb the practical farmer. He is fully aware that his own methods and plans of farming do not always correspond with those of his neighbor. Having received the opinion of different writers, he must exercise his own judgment as regards what would be best for trial on his premises. It is very fortunate indeed for the farmer when he can have both sides of a practical question presented clearly before his mind. It assists him in his own thoughts, and in the end will force him to a conclusion. For this reason one agricultural paper is not enough in the household. He should have several, so that he could have the privilege of comparing notes, and the farmer's

sons and daughters would soon be ready to engage in the discussion of practical topics. Having considered the practical and literary together let us separate them for a few moments and reflect. Rev. Henry, Ward Beecher, the eminent divine, was considered a book farmer. He received the largest clerical salary of any clergyman in the United States. He purchased a large and valuable farm at Peekskill on the Hudson, and put three hundred thousand dollars into it. Since his death it has been begging for a purchaser at only eighty thousand dollar, and still it lingers on the market.

Horace Greely was also a book farmer. He was earnest in his entreaties for young men to go west, take up land and become farmers. It is said, a certain young man thinking that there could be no mistake in the advice of such a man as Horace Greely, converted all of his earthly possessions into cash, amounting to several hundred dollars, and took up his abode on the frontier. In a few short years he had exhausted all of his funds and was compelled to abandon his western farm, and if possible return to the land of his nativity. Taking the place of a tramp, enduring much exposure and a weary journey, he appeared at Mr. Greely's place of business, and informed him that the advice he had been giving proved a failure. Horace Greely fixed his eyes upon him and said, "Young man, you lack enterprise."

Jacob Biggle, a well known character in the little *Farm Journal*, is noted as a book farmer. Perhaps no book farming ever brought before the public, has caused so much merriment and laughter as that of Jacob Biggle. He is represented as the proprietor of the Elmwood farm. His entire business was universally a failure. His theory on plowing is, if it pays to plow at all, it pays to plow deep. So he puts the plow down beam deep, turns up the yellow clay, and gets but little corn. His conclusion, however, is that he applied too much commercial fertilizer and burnt up the roots. If that is not the cause then it is that he didn't plow deep enough. He finally abandons for a time the plowing business, and goes into the dairy; thinking in all probability it will double his profits. The first thing is the building of an expensive silo, which consumes the labor of all of his hired help for one season. That does not daunt him in any way, for he has been reading a work on ensilage, by John M. Bailey, of Massachusetts. He learns that by this process of feeding, milk can be produced for one cent a quart, butter for ten cents a pound, pork for three, beef for four, and mutton for nothing. The previous cost to him has been, milk ten cents a quart, butter eighty cents a pound and as much again for the meat as it is worth in the market. He proposes to grow the same kind of fodder corn to fill the silo that he has been in the habit of raising. He concludes that kind will be more suitable as it does not run much to ears. The only objection to it is that it grows such small stalks. With proper treatment, however, he thinks that can be bred out of it. For his stock of cows, he purchases thoroughbred Short-horns. The churning of his butter is an interesting process. He puts the cream into the churn at eight o'clock in the morning; John the hired man, churned resolutely for one hour; then Mr. Biggle made an examination. He found the cream greatly swollen, nearly filling the churn. He was very much gratified with this, thinking that it assured large amount of butter, and convinced him that the Short-horns, were a very choice breed. The faithful servant churns another hour. Then there was not so much alteration, and not much increase of bulk, for the churn was completely full. But John showed signs of weariness.

He was encouraged by the proprietor to continue, and after a few moments he was relieved by Mr. Biggle himself, who took hold. He commenced his work in a very rapid manner; the lid soon flew off, and the cream spurted out like a Geyser, covering the entire floor. Harriet, the good wife of Mr. Biggle came to the rescue, and she churned until both of her hands were blistered. Another hired man was put on duty for the afternoon, and both cold and hot water was turned into the churn at different times, but all was of no avail so far as butter was concerned. The day was completely consumed in this kind of maneuvering, when the last man was exhausted, and gave up in despair. Then they dumped the contents of the churn into the swill barrel. Mr. Biggle then thought it was best to abandon butter-making, and he went to shipping and selling milk. His first item of expense was a new wagon, on which to deliver the milk to the nearest railroad station, four miles distant. After making a few trips in the delivery, he found letters tied to the can covers, from his milkman in the city, telling him not to bring any more such milk to the station as he had been sending, for he would not take it. Mr. Biggle wasn't to be insulted with this kind of correspondence, so he kept sending the milk. After a few months he thought he could make his trip to the station in less time. So he got belated, and the train went on without the milk. This raised the ire of his milkman, who wrote a very impudent letter and attached it to the can cover as usual. Things continued in this way until late in the season, when Mr. Biggle purchased some fresh cows to keep up the flow of milk, and just at this time, his milkman absconded with all the money. Mr. Biggle then says, that he believes that books and newspapers are not much help to a farmer after all. They get him on the wrong track, and it costs a pile of money to get out again. "Said he, I have been very much grieved, and almost out of patience, because my neighbors didn't agree with me; but they respect me after all, and expect soon to send me to the legislature." These examples of book farming are only extreme cases, and are not mentioned with a view of discouraging the use of agricultural literature. It seems like an utter impossibility in this day and age of the world, for farmers to succeed without a full knowledge of their business. They need the very best education of which their circumstances in life will admit. They need a library somewhat different from their professional brother, nevertheless they need it well stored with useful books. There is now and then a farmer successful in his business, who is very illiterate. Perhaps he can scarcely write his own name, or do any example in simple interest, and yet he has some process by which he controls his thoughts and manages to get along. But how very embarrassing it must be to him all his life. How many enjoyments he is deprived of because of this condition of things. If his mind is brilliant enough to succeed without an education, what would it have been if it had been thoroughly disciplined. The practical and the intellectual go hand in hand with the successful farmer. They are not to be separated. The moment that this is done power is being exhausted. It is like capital and labor. One needs the other, and when they are combined, harmony and union prevail, and joy and prosperity clap their hands.

INTELLECTUAL DEVELOPMENT OF FARMERS SONS.

By JAMES G. McSPARREN, *Green P. O. Pa.*

(Read at Lancaster Institute.)

As I enter upon the consideration of the subject which forms the basis of my paper before this institute I am impressed with the fact that there is to some extent a prejudice, and not without some reason, in the minds of many intelligent and well disposed persons, against the theory of a higher education, on account of the risks and difficulties attending the receiving of it. It is a fact that cannot be disputed that in many of our institutes for the education of our boys and girls, the discipline, or rather the lack of it, fails so completely in its avowed design and aim that while there may be a *slight* development of the intellectual faculties there is too often a *decided* development in the tendencies that debase rather than exalt. A fault however not in the theory but in the system. I would consider it therefore not as intellectual development regardless of its associations, but that intellectual training and development which not only enlarges the faculties of the mind but directs the line of thought and action into those channels which tend to ennoble, and cultivates those qualities of mind and heart which make true men and women, practically manifesting itself in practical business life.

What is intellectual development or education? An expansion of the reasoning faculties and powers of the mind. A definition comprehensive and far-reaching. We would naturally suppose there would be but one opinion as to the propriety and necessity of the higher education of farmers' sons and daughters. And yet there are many, very many, farmers, and others too, who are fully persuaded in their own minds, and do not hesitate to say so, that farmers' sons and daughters are incapacitated for farm life and work by this very influence. What a delusion. An allwise Creator has given us these intellectual faculties as well as our physical abilities. Within the head of the tiny infant is the plant in its infancy of what may grow to the massive intellectual tree. But it awaits development, just as the little body develops step by step into physical manhood, so the little brain would naturally outgrow its present bounds, and develop to the intellectual caliber of a well-rounded man. But to reach this it must be cultivated, it must be brought into active, practical use. That little arm will *remain* about as useless as far as practical worth or value is concerned after years have passed, as at present, unless effort is made and the sinews and muscles thereby hardened. Those little feet will never acquire the firm elastic tread until the effort is made, feeble indeed at first, but persistent, to stand upon them, just so the intellectual faculties will remain a comparative dwarf unless through cultivation, they are expanded, deepened, and acquire the vigor of full manhood in time. But here the analogy stops.

The physical development continues but for a time. The zenith is reached, and then after a time the powers decline, and the vitality can never be restored in the same degree. Not so however with the mental capacities. We can truthfully claim that long after the physical powers wane, and indeed until the sands are well nigh run, the mental capabilities and capacities are ever enlarging and expanding. Can it be possible then, that by cultivating these God-given

faculties we are, or can be, in any sense incapacitated for honest toil? On the contrary, through this expansion of our mental faculties we are lifted far above such weakness and led to pity that creature who looks upon labor as anything less than honorable. My position I infer is by this time quite well understood. I take the high ground—and I sincerely hope that public sentiment will stand by me—that thorough substantial intellectual development is highly essential that our sons and daughters may fill acceptably and well their places in our nation. I will go farther and claim that the future well-being of our class, as well as of our government, depends in a great measure upon this very point. But before I enlarge, I would offer an argument as an incentive to every farmer's son and daughter to acquire this intellectual training. It should be the aim of every individual to live so that the world will be the better of their having lived in it. It is an entirely worthy and laudable ambition to inspire in the breast of every youth that their individuality should manifest itself, that they as individuals should reach such a point and place that the world will take knowledge of them and accord to them their due. It is a fact that this is an age of reason and progress. He who supposes that the plodder, depending solely upon his muscle can compete with him who intelligently combines muscle and brains will certainly be left in the race. The time was perhaps—but even this hold true in semi-civilized nations only—that the strong arm and brave heart were the arbiter almost without exception of every individual's position who was controlled in the least by ambitious motives. But that age is indeed an age of the past, and progress and reason now go hand in hand in the accomplishment of the grand purposes of man. Would the farmers' sons and daughters be left behind in this commendable race and aim. Then they must be impressed with the importance of qualifying themselves for it. Not only can they decide through their own observations and study of the present age and tendencies, but history is replete with striking examples impressing this same truth. Greece, the little yet mighty nation, was made so because she excelled in the number of her learned men. Her name has been handed down from century to century, and in our minds fills a place of the highest admiration, because her people are known as those who excelled in the arts and sciences and intellectual greatness. The incentive on their part was not greater than upon ours. Citizenship in Greece was not equal to citizenship in this grand republic. Let us look at it from this standpoint. Our form of government is a grand one. No really intelligent citizen can be aught else than proud of the fact of citizenship under such a government. But we must not lose sight of the fact that it brings with it responsibility. Each and every citizen is a factor in the government—each has a place to fill and a work to do and they should do it intelligently. How can they do this if their mental caliber is unable to grasp and comprehend the intricate question that must be solved intelligently from time to time through the exercise of the elective franchise? And still another consideration this responsibility is only the more decided from the fact of our great numbers as a class. As we remarked, our form of government is a grand and noble one I am not one of those who would "scent the battle from afar" neither would I forget that "eternal vigilance is the price of liberty," and I therefore claim that the good citizen will never be mindful of the fact that there are dangers ever threatening a republican form of government; that there are those in our republic—and citizens too—who are not heartily in love with its democratic form, and therefore the great

rank and file should not only be on the alert but be capable also of discerning the signs of the times and be ready for action. The responsibility then of the great class of farmers in this particular cannot be over-estimated. There is no interest or calling in the nation that can compare in magnitude and importance to the great calling of agriculture. There is no interest in which the substantial material well-being of the government and nation so much depends as upon agriculture. Other interests may fluctuate, may rise and fall as the tide, may, under the force of circumstances, even cease to exist as an industry and the nation scarcely realize it. But not so with agriculture. It stands as the mighty bulwark of the nation, the great arm upon which the government can lean, so to speak, with perfect security and confidence.

To give an illustration of this allow me to digress for a moment. We all remember the Franco-German war of 1870-71. We remember well how disastrously it seemed to terminate for the French government, the heavy indemnity imposed on them by the German government. We remember also that in an incredible short time every dollar of it was paid. What was the secret? The fertile soil of the hill and valley, under the careful tillage of the French husbandman was made to yield abundantly and from this soil—the source of wealth—the wherewith was received to pay the indemnity imposed by the successful power. This proves the reliability as well as the recuperative powers of an agricultural country such as ours and France. But to return. Not only is agriculture the substantial interest in the land but agriculturists are the substantial, conservative body to whom our government must ever look in every emergency that may arise. Is it possible then to place the standard of intelligence too high, in view of the responsibility that must ever rest on the American farmer as a citizen? And just here, in this connection, for it has special bearing right here, let us consider the equally weighty and important question why should farmers' daughters be well educated or their intellectual faculties be well developed? I am not one of those who claim that woman is not possessed of in as great degree, the mental faculties as man. I believe on the contrary, that she is, and from the highest and most weighty considerations should have these faculties well developed. Not in the same direction probably that the sterner sex is educated—(although any knowledge that man may be possessed of will do her no harm), but in these directions that while the mind will be expanded thereby, the gentle, refining, elevating character of the true woman will be so completely rounded out that wherever she is, whether as the sister in the home exerting the gentle ennobling influence that only such a cultured mind can; whether as the wife and mother whose mind is only more thoroughly developed by her additional years of experience exercising that commanding power, unconsciously to herself and others too, over husband and children that make her to them the ideal wife and mother, while she through her example and mental power is ever lifting them to higher aims and aspirations; or, as the woman in her community and the society in which she moves, manifesting the same culture and exalted traits of character that make her influence most potential for good. Some regard the advocate of woman suffrage, among the sterner sex as those who hold woman in the highest esteem and acknowledge thereby in a greater degree her mental and moral worth. I cannot acknowledge this, I take second place with no one in my appreciation of woman nor would I deny her a single right. But to the proposition

to confer the right of suffrage I say most emphatically, *No*. And in answer to the assertion that in meeting, and disposing properly of, the moral questions of the day the exercise of this right would aid, I say again I cannot subscribe to this. You may ask why? Does not woman now exercise an influence upon the man and the citizen? In casting our ballots on the moral questions of the day does the well-being of our wives and daughters or their counsel and advice have any weight in aiding us to reach a conclusion as to duty? To whom do many of the great men of the past and present owe, and frankly acknowledge, whatever they are today? Could woman exert a more powerful influence than is at her command to-day by clothing her with the right of suffrage?

It is on account of the great influence woman exerts that it is so highly important that *our* daughters—farmers' daughters—who will in time constitute such an important body of the women of our land—should be educated that this influence may be exerted aright and tell so decidedly as it will upon the citizenship of our country? Then again our sons and daughters should be educated in order that they may the better prosecute their vocation. There was a time when almost every one thought, and some think so still, that any one could farm, that it was almost a crime to allow a boy of fine intellect to plod away upon the old homestead but should choose for his calling some of the professions. It was thought, too, that the calling in itself was naturally degrading, and hence our country boys were accosted by their city cousins as "Country Jakes and clod hoppers." But sentiment is changing somewhat and many learned professional men will now tell you when that they are to preach in the country they take their best sermon; but when in the city, they take their best coat. What a mistake to suppose that it does not require intelligence as well as excellent business tact to operate a farm. Whom among all the various callings in life comes so directly in contact with nature and nature's laws as the tiller of the soil? Where can there be found a field promising richer results for the philosophical or scientific student than in the cultivation of the soil? And in what other fields is there the same opportunity to employ to the best advantage mechanical skill and ability, as is found upon the farm? The fact is there are exceedingly few farmers who can lay any claim to being master of their business., and it is notorious, also, that as a rule, those who suppose they know the most, know the least. And this very class, too, will contend that education, to any considerable extent, is an absurdity. Let us test their knowledge. You cultivate your farm from year to year. We take it for granted that you know the various plants draw from the soil and atmosphere what they need for their development. Take a sample of the grain you produce and tell us just what it contains. Take a portion of the soil on which his grain is grown and tell us just what it contains. Tell us just what the atmosphere will supply as plant food and just what the plant must depend upon the soil for. The answer of ninety-nine out of every hundred farmers will be I cannot do this. Then are you master of your business and do you want your sons to be as ignorant of the essentials to successful farming as you are? Hundreds of thousands of dollars have been absolutely wasted in the past, and are still being wasted, through the ignorance of the farmer as to what crops his soil was adapted to, and what he should apply to the soil to aid nature in the production of his crops. Can any one doubt then the necessity of thorough, practical education for the farmers sons from a successful business standpoint?

Farmers' sons and daughters should be educated to lift us as a class to a higher range of thought and the exercise of independent manhood. "Knowledge is power." Not only inasmuch as the possessor of it has an ability and power which others do not possess, but the consciousness of this power on the part of others and the knowledge on their part that the possessor of it cannot be imposed upon or deceived, adds very decidedly to their influence. There is no lesson more important, that the farmer should learn, than this, that he must care for himself and his interests. This is absolutely necessary. I take it for granted that farmers are learning this important truth. And yet I may be assuming too much, for the past clearly proves that farmers as a class learn slowly, so very slowly, that to the thoughtful, intelligent mind the question will arise from time to time, will he ever be able to exercise that independent manhood so essential to his own success, and laying every petty prejudice at his feet, remember that he has decided interests at stake, which interests are paying tribute to the giant Moloch monopoly, while the very life blood of his calling is being sapped by his doing so. In looking about us, observing closely the signs of the times, consulting the county records I think we will be convinced that what we thus learn will but confirm the opinion we have already formed through evidence presented in other ways, that the interests of agriculture have reached a low ebb indeed. From every section of our commonwealth the same wail is being heard, what are farmers to do? Can any one who thoughtfully studies the history and statistics of the past be surprised at the present condition of our interest? When we invite disaster can we be surprised if it comes? When we deliberately kiss the hand that smites us, and place our interests in the hand of the Juggernaut Monopoly, is there any cause for wonder if they are crushed beneath its wheels? Lay the hand ever so lightly upon the railroad interests or the manufacturing interests; insist ever so mildly that the capital thus employed shall pay a small share proportionately of the burdens of taxation; give expression to the sentiment that corporations and manufacturers should be content with a reasonable profit on their investment, and a howl is raised heard throughout the entire land that we would cripple our industries. The infants who cannot possibly be nourished or sustained unless they have the liberty to put their hand in your pocket and mine and take according to their own pleasure. The pet wards of the nation whose interests must be cared for and watered even though other interests suffer and die as a consequence.

On the other hand, lay your hand upon the agricultural interests as has been done in the past, and is being done more and more from year to year; insist that they shall pay all their own taxes, and about all of the taxes of the corporations, capitalists and millionaires, and besides pay tribute, and not light either, to those who receive the fostering care of the government and who are forming as fast as it can be done, through the agencies in their behalf, a monied aristocracy dangerous to our nation. Do this I say and do we find the same spirit of resentment on the part of the agriculturist? No, but on the other hand his subserviency manifests itself, he pleads his inability to understand the question which have such a direct bearing upon his material interests, and permits himself to be led in thought and action, by those who seek their own aggrandizement at his expense. May we not hope for a better state of affairs, and will not farming become more remunerative? Upon what do you base your hope for any permanent improvement? I am not a prophet nor the son of a prophet but to my mind it requires

no prophetic vision to plainly tell that farming has seen its best days in our state and nation unless the farmer wills it otherwise. He has in his own hands his destiny. It is for him to determine whether, as a class we shall allow other industries to press us step by step to the wall, and reach soon the point long since reached by our class in the older countries of the world, or take the stand like men, and waiving aside every obstacle rise to the full height of our opportunities and privileges and rights and thus manifest to the world that we not only know our rights but have the manhood to maintain them. We must now be mindful of the fact that we have a mighty problem and task to grapple with. And that farmer or that man, whoever he may be, acting ostensibly in the interest of the farmer, who would mislead through any incentive in this crisis is unworthy of confidence or regard. The tillers of the soil have become a byword and reproach in many of the countries of Europe. There standing here will ere long be no better. The agriculturist in Europe is responsible, in some measure at least, for his position. We are and will be wholly responsible for ours. To whom must we look and on whom depend? On ourselves and our children. How important then that they should be qualified, that their natural abilities should be as well developed as possible, that they may be able not only to grasp, to comprehend the full meaning of, and bearing of the issues of the day upon their interests, but be possessed of that stamina, which knowledge begets, which of itself commands respect and before which mountains of difficulties, standing in the way of farmers' rights, will dissipate. Farmers must learn that they must neither surrender or compromise their position. Agriculture can still maintain its proud distinction among the industries of the land but whether or not it shall do so depends upon those who cultivate the soil and they must not only be taught the important truth that they must take care of themselves, *but be qualified to do so.*

THE BARN A MANUFACTORY.

By A. P. YOUNG, *Millville, Columbia County, Pa*

Farmers as a rule have been paying large profits to, too many people on nearly everything they have bought. An equal number have been standing on the other side to live off the profits made on what the farmers have to sell. Between the two the margin left has become so narrow that it is impossible for the farmer to pay the enormous taxes exacted on real estate, educate their families and live.

So great has this pressure become that a new departure is an absolute necessity. No article produced upon the farm should leave it until developed to the highest degree possible. No bushel of grain or ton of hay should go from the farm as such, but should be sold as meat, wool, milk, cream, butter, eggs, etc., leaving for the farm the fertilizing material evolved in their manufacture, to raise more grain, more fruits, more berries, to make more profit for the farmer and more healthful diet for the people. To get away from the excessive exactions of dealers on both sides the farmer must be a manufacturer and salesman, making up his production into the most compact form possible, taking them into the market and delivering to the consumers fresh and in

good condition, preventing adulteration and deterioration by storage. The farmer by this method getting more for his labor and care and the consumer more and better goods for his money.

Manufacturers and traders it is well known have engaged the principal attention of our legislative bodies for years, while the farming interest has been neglected, or almost entirely ignored. This is flagrant injustice, as both of these branches of business depend very largely upon the success of agriculture for their prosperity. Our lawmakers should therefore speedily correct the error of their ways by substantial enactments in the way of equalization of taxation and the placing of all industries on a fair basis with relation to each other. It is unquestionably the best policy and should be the aim of every country, community and individual to work up all productions into the most complete form possible for use or consumption before allowing them to enter the channels of commerce.

Agriculture is the feeder, the principal foundation, of manufactures and commerce, and deserves equal attention with them from our legislation.

From time immemorial the farmer has been accustomed to hearing his productions spoken of as raw material, and treated as material that had no particular value, the price of which was not fixed by any reference to cost of production but regulated entirely by the law of demand and supply. So persistently has this view of the farm and its production been dinned into the farmers ears that many of them have come to believe it themselves and they have become satisfied with the mere husks of the production of their own labor.

Everybody else who changes the form of an article or combined two or more substance so as to make something else is a manufacturer and must be protected from the pauper labor of other countries, and must be allowed to conduct business with much less percentage of taxation on the money invested than the farmer. The fact that the farmer has to compete with this same class of labor is entirely lost sight of.

Webster defines raw as not altered from its natural state. Untouched by art. Unwrought. Unprepared for use or enjoyment. Material is the substance of which anything is made.

If these definitions be accepted as correct it will not be a hard task to make clear the fact that the productions of the farm are not raw materials. Meat, milk, butter, eggs, wheat, corn, oats, hay, are all ready for use and enjoyment.

The farmer is a manufacturer of food and he must wake up and use a manufacturers brain if he would be successful. There is an upper and a nether millstone between which he is being ground. Less production by reason of exhaustion of the soil. In his efforts to have something left as profit after paying for labor in fertilizing cultivating preparing and marketing, he is neglecting thoroughness, and has been drawing heavily upon the soil. Less price for what is produced by reason of an army of middlemen coming in for a share, transportation companies with their exaction of what the traffic will bear and gentlemen of leisure who have money to invest in "corners" and who, sure of their prey, speculate and gamble on his products long before he has them ready to put upon the market. Less production. Less prices for what is produced. The expression of the southern farmer is apt and to the point. He *makes* a crop of corn or he makes ten fifteen or a hundred or more bales of cotton, or he makes hogsheds

of sugar, barrels of molasses, as the product of his plantation. So all farmers make their crops. Their wheat, corn, potatoes, fruits and hay. Their beef, pork, butter, poultry and eggs. Make them by labor and care out of warp and woof skilfully produced and gathered from the farm; but some of them needing still further a vast amount of care and manipulation that the finished product be perfect of its kind. In the web before us the soil may stand for the warp, the manure and fertilizers necessary to perfect the crop for the filling, while the know how to apply them, the skill in cultivating, gathering and preparing for use or market, makes the labor of production as intricate as the mysteries of any trade or profession and much more so than most of them.

The manufactured product of one industry may be and often is the raw material, out of which another makes new combinations, higher types, more advanced forms. Other materials may need to be brought in. Other forms may be required that more advanced uses be brought out and enjoyed.

Pig iron is not usually classed as raw material; yet it passes through the hands it maybe of several manufacturer and artisans before reaching its ultimate use which is possibly, watch springs, surgical instruments, needles and the like, in the hands of each of whom it is raw material.

Cloth is raw material in the tailor's hands. Yarn is raw material at the knitting factory and so it is leather at the boot and shoe factory. It is evident from what is said above that the term is entirely relative as usually applied. An application different from the above and one fully justified, is that raw material is that kind of material into which the element of labor has not entered. Ore in the mine, timber in the forest, coal in the mountain, oil in the strata of the earth, fertility in the soil out of which crops may be made, these are raw materials and only raw materials while remaining undisturbed where nature put them. When the miner locates his shaft and commences work the coal or ore he is after from that moment begins to take on the character of manufactured product, and the worth of the labor follows it on until finally it emerges from the breakers or furnace. The tree in the forest, from the moment it receives the first stroke of the ax with a view to felling it and converting it into lumber, or, indeed, from the time the woodman commences his road into the forest to reach the tree, any prduct whatever into which the element of labor enters in no matter how small a degree is manufactured product to an extent. Hence, when the farmer commences to put his land into condition to farm, to build a house in which to live and a barn to store crops and to work them up into more valuable, more salable or more profitable forms as well as to shelter animals and tools, the profit derived from the goods turned out should bear the cost of every step necessarily taken. On a well ordered farm the barn in its arrangement, surroundings and equipment in many ways takes on the character of a manufactory. Its primary object, that of sheltering crops, animals and tools, as scarcely more important than the secondary object of providing for the working up of the crops, combining and manipulating the foods produced and purchased so as to get from them the greatest possible return in the growth, meat, milk, wool, eggs, etc., and so combining the residual—the waste products—gathered from all sources as to make them contribute most toward adding fertility to the farm.

There are scarcely any farms that would not be more remunerative if made more fertile. Plowing, harrowing, seed and seeding occupy as much time, cost as much for a poor crop as for a good one. Under

the natural law of competition, the pressure of monopolies, trusts and transportation companies, farm products have been growing cheaper and cheaper making it necessary that the farmer take the utmost pains to increase the return of his acres by saving in cultivation, in order to keep pace with the decline in price. There are but few sections in Pennsylvania where two blades may not be made to grow where one grows now. If the pressure of the timer brings about this latter result it will not be an unmixed evil, for the lesson learned will be of use after the pressure has been removed and equilibrium once more restored as must be the case sooner or later as a result of more intelligence and more disposition on the part of the farmers to stand together as a class for justice and right. Other industries seem to be able to maintain prices, keeping up the price of labor and of their commodities. If equilibrium were restored between price of labor and everything he buys, the farmer might be content to plod on, but to be made the pack horse to carry the major part of the expense of the government, contribute largely to the prosperity of all other classes by furnishing food products at less than paying prices, it is not just the thing to have to pay trust prices for articles he must buy. But while these difficulties and disadvantages are being got rid of by the slow moving force of education and public opinion, there are within our reach many improvements in the way of bettering still further our methods and surrounding. Frequently much is lost from faulty construction of stables allowing a valuable part of the manure to leach away. No stable is complete until it has a water tight bottom. This being secured and plenty of absorbent supplied so that the animals are enabled to keep themselves tidy, no foul odor will be found in the barn and yet the manure can all be saved. In removing manure from the stables to the yard care should be taken to distribute it evenly lest it fire-fang and much of the substance be lost. If the manure from horse and cattle stables be thinly intermingled and trodden down firmly by the animals there is no danger.

One who goes about the country with eyes open will notice this fact. Where land is naturally good and large crops are comparatively easily produced, less care seems to be taken with the by-products. Fertilizing elements are allowed to scatter and waste to a great extent. On limestone lands where large crops of wheat are usually raised the barn generally has a large yard on one side of it in which the straw is stacked as threshed and into which the manure as it accumulates in the stables is thrown without regard to anything only to get it out of the way of the swinging doors and to allow the animals to get in and out of the stables. The whole entirely exposed to the elements except perhaps a little streak covered partly by a projection or overshoot designed primarily to protect the doors.

The water from the clouds and that running from the roof combining to leach out and carry away much of the substance. In fact all that is soluble and immediately available is thus carried away down the road into the nearest stream and this is repeated by successive rains fast as decay renders elements soluble. The substance taken, the husk left.

This is a sad state of affairs for the farm, and a drain which no land can long sustain and pay for cultivation. A barn with a yard thus situated is not a manufactory, at least not an ideal one, so far as saving all its products are concerned. *Cover it up* and do it immediately, before another single dollar's worth of fertilizer is bought. Save what you have before going to market to buy more. What would be thought

of the manufacturer of cloths and the goods he would turn out if he were to allow his yarns, after having them prepared, to lie exposed to the elements until so rotten as to hardly hold together while being woven?

How would the tanner succeed who would expose his bark, after having it ground, to the rains to be soaked out before putting it in the vat for holding the liquor and treating the leather? Ashes exposed to weather become leached almost as effectually as though put up in a leach tub and the lye regularly drawn off. These are examples of waste similar to the waste of manure from an exposed yard, the yard which should be the grand store house to the manufactory from which are to be drawn, or rather should be drawn, the elements that are to make the future crops. To make or unmake the farm and the farmer's prosperity.

In conclusion. It is said the price of liberty is eternal vigilance. Might we not as truthfully say the price of a well-kept barn is constant attention. Wise is the man who exercises eternal vigilance over his barn, its occupants, and all the interests that center there; looking carefully after the little detail as well as after the more weighty matters, for in those things that are frequently overlooked, may, perhaps, be found the hidden channel through which profits have been escaping, which, if saved, would incline the scale to the favorable side, changing despair into cheerful hopefulness, and brighting the pathway onward.

THE ADVANTAGES OF THE CREAMERY TO THE FARMER.

By Z. S. STEVENS, *Huntingdon Mills, Pa.*

(Read at Benton Institute.)

The subject of dairying, or the creamery, has become one of vital importance to the farmers of northern Pennsylvania. We will simply endeavor to show that, as a branch of husbandry, it has been most grievously neglected. Perhaps, for the money invested, there is no branch of agriculture that yields greater profits, even in the neglected state we find it to-day. There is no subject related to the farm, that needs a more thorough investigation, a closer study of cause and effect.

We must concede the fact that the Middle and Eastern States can no longer compete with the great west in the production of the cereals, neither can we in the production of meat and wool. True we can by the use of fertilizers produce as much per acre, but with our rough soil and short seasons must necessarily fall very far short in our acreage. Besides with land ranging from fifty to one hundred and fifty dollars per acre, with the corresponding high taxes, with a constant drain upon our crops for fertilizers to recuperate our wasted soil, we cannot hope to compete with the great prairies, purchased at merely nominal figures, with her yeomanry living in dugouts, her great network of railroads penetrating and permeating every market in the world, putting them but a few cents per bushel farther from market than we are.

The American mind has been so active as to so contract the transportation of meat that we stand aghast at its cheapness.

But there is something left us in the dairy product. None have been able to so annihilate distance as to preclude us from our market with

good fresh milk and butter. But, to avail ourselves of the best results of this product, we must keep pace with the moving world. Old theories must be abandoned and give way to the mighty tread of advancing science. What are the facts relative to this mighty product? We say mighty, because it is surpassed only by one product of the farm, which is corn; the last statistics at hand, give us a production of \$700,000,000. While the dairy product is estimated at \$525,000,000. Somebody, somewhere, is producing large quantities of milk and butter. But where is it? Much of it is produced where the corn is grown. New England has given up the race in corn growing, and is now turning her attention to dairying, with most pleasing results. But she has abandoned the old theories of every fellow for himself, and seized upon the new idea of scientific coöperation, which reveals to them the fact, that the most delicious of human food, cows' milk and butter, can be produced in its native purity, and thus made more palatable, and consequently more remunerative.

But the creamery in no sense can be carried on without cows. We are compelled to admit that within the last two decades, live stock upon our farms, particularly milch cows, has very materially diminished. This doubtless is owing largely to our close proximity to the great coal field, where we find the irresistible temptation to sell our hay and straw with this yielding, we witness a terrible drain upon our soil, and we can safely say that we have been putting the better part of our farms into our vest pockets.

Perhaps the *greatest impediment* lies in the fact of the great deterioration of woman's strength. Hitherto, the care and management of the dairy has devolved upon the women of the farm. When we think of the drudgery incident to farm life as practiced by the great majority of our good matrons, is it at all surprising that our girls shudder, and even rebel, at farm life? choosing rather other avocations in the towns and cities. Live in pent up places, sleep in the attics, content to breathe the foul odors of dense populations.

Another great drawback to the dairy interest, has been our failure to comprehend the possibilities of a cow, or even to bestow one solitary scientific thought on the conditions requisite for the production of milk and butter. We have simply regarded the animal that possessed an udder and a pair of horns, *as a cow*, wholly regardless of her ability to produce butter. Then what are the facts that have been developed by scientific men?

From the scrawny, unsightly, undeveloped cow that produces but three pints of milk per day, with only three grains of butter, and that as white as the drifting snow, we now have the well-developed strains, yielding anywhere from one to five pounds of butter per day. Again, how few of our farmers have given any attention to the care of cows in winter, we see cows feeding upon the highways without even the shelter of a yard fence, and the owner wondering why the cows yield so little milk. Not content with feeding out in the blasts of winter, but driving them over the ice to some frozen brook, there to gorge ice water to freeze up all the avenues of milk production, you could just as reasonably expect heat from a stove filled with ice. How much we owe to scientific men. We learn from them that there is no article of human food so highly susceptible of foreign influences, so contaminating, unpalatable, and dangerous to health and life as milk and butter. It is a fact that milk is almost as sensitive of atmospheric changes as mercury itself. Hence we find another great impediment to individual dairying,

the indiscriminate setting of milk to raise cream. The old open pan, in damp odorous cellars, in a temperature anywhere from sixty to one hundred degrees Fahrenheit, produces cream, that is leathery and filled with all the odors of its surroundings, and cannot produce butter of fine quality.

But I may now approach debatable ground and incur the displeasure of many good matrons. We are now reaching our conclusions on the same basis that railroads are created and managed, banks created and sustained in short our manufactories and particularly our manufactories of woolen and cotton fabrics. Doubtless many in this audience have a distinct recollection of the old wool wheel with its buzz and dirt, with the light-hearted maiden tripping up and down the room for six months of the year, the flax and tow wheel scattering the broken fibers all over the houses, then the old woolen loom with its thunder and bang for the next six months, beating out those unsightly, yet comfortable fabrics. But where are they to day? Hidden away in the loft, or perchance, in the rage for antique adornments, you may find many of them, varnished and garnished occupying places in your parlors, most graciously preserved as relics of the past, and the mighty powerloom, their successor, sending out its multiplied yards of beautiful fabrics at infinitely less expense, while the maiden sits gracefully at her *crocheting*. This is the outgrowth of scientific investigation, and pray what is science? It is simply the application of facts. All business to-day, is rapidly being concentrated and that mode which offers best results is being adopted in every department.

Then as farmers shall we stand in amazement at the rapid advancements of other departments of industry, and we linger on the barren shores of obsolete ideas, to remain the butt of all jokers, and forever be dubbed old hayseed, buckwheat, and country cousins? While we ought to take rank with the lords of creation? Let us cherish, then, the great developments that science has brought to us. The creamery of to day is the outgrowth of earnest investigation, the application of scientific principles, the abandonment of old theories, and the concentration of effort and capital in the production of butter of a uniform grade, and that the highest standard. With a high standard of production, naturally comes the highest price attainable in the markets; we are not here to say that butter of the finest quality cannot be produced by individuals, for we are glad to know that very many of our farmers wives do serve their tables with a most delicious article, but this can only be where the conditions are equal. Any number of the ladies present may produce samples of their butter and surprising as the statement may seem, not two of them would be alike in color or flavor.

So many contingencies may and do arise to interfere with successful buttermaking. The hour for churning has arrived, but the good housewife is seized with an acute sick headache, or perhaps some neighbor or friend has died, or visitors break in on the family and the churn is set aside until the convenient hour—but the cream is spoiled. Down town is a niggardly merchant and to get even with him—one woman will put four ounces of salt to sixteen of butter, that levels him up. Another has a cross child and she cannot take the time to churn with cream at the proper temperature and she dumps in the hot water and of course her butter is of a snowy whiteness.

These contingencies have but one result, depreciation of value. Not so with the creamery. No indiscriminate setting of milk is allowed,

no deferring the time for churning can be tolerated, the cream is gathered regularly, and always churned at the same temperature.

The advantages of the creamery to the farmer are numerous. It relieves the women folks of the drudgery of churning, enhances the price of the product, acting as a great leveler, not as we would level a hill by laying it low, but as we would fill up a depression, making the poorest as valuable as the best.

It begets a thoughtfulness among farmers, institutes comparisons, A. wants to know how B. succeeds with his Jerseys, each watches the others monthly returns, comparisons stimulate rivalries, and rivalries induce an increase and improvement of stock. The increase of cows upon the farm will recuperate our wasted soil.

The creamery is to the old churn, what the power loom is to our mother's loom, it is a more economic mode of making butter. It will do the churning for a whole valley, embracing a radius of ten miles, by one man, in the same time it will take all the women of the same territory to do it.

It has been my privilege, for the last two years to become acquainted with its operations. To know its effects upon the markets at home and abroad, and I say with a certain knowledge that the effect has been stimulating.

The farmers, during the summer season, have realized from two to three cents per pound more for butter at home, than they could possibly have done in the absence of the creamery.

In the year 1887 the stores were overladen with butter at fourteen cents. The hucksters would not take it at that price, only as they could select the best. In 1888 we opened our creamery and with a short run of five months paid our patrons an average of eighteen cents per pound at their doors. In 1889, when there was the greatest production ever known, we paid our patrons an average of eighteen and one-half cents per pound. For two or three months of that time we paid for butter in the cream from one to three cents more than the home market price. There is another fact I would impress upon your minds, those who pay cash for butter when the production is large, will not only buy from the best known buttermakers. While the creamery takes the poorest at an advanced price, I want you farmers to hear it, and especially you ladies who pride yourselves in making an article of high degree. What advantage have you over the careless, slovenly woman who gives the subject no thought? What have you to compensate is another advantage the creamery offers? One that is overlooked by very many. The merchant does not want your butter, consequently taxes you several per cent. more in goods than he would for cash. There is not a country merchant but that will tell you, he has lost rather than made on the butter he has handled, I know of but one merchant in my circle of acquaintances but that hailed with joy the advent of the creamery.

To sustain the assertions that the presence of the creamery has a stimulating effect upon the market, I will call your attention to the recent effect upon our local market. Before our creamery closed for the winter, the dealers of Shickshinny advanced butter to twenty-five cents cash. Of course that drew off a few of our patrons, but as soon as it closed the price went down to twenty-two cents in trade, just what we had been paying in cash.

There is another fact that you who are not acquainted with the markets do not dream of, and that is western creamery butter is being

thrown upon our market in bulk, butter that is fine as silk, and at very low prices, but we have this advantage, we can go into the market every morning with fresh butter in packages to suit the customers and get far better prices. Who will say then, in the light of all the facts, that as the old wood plow gave place to the smooth cast iron, for as the reaper succeeded the hand sickle, the locomotive the stage coach, the power loom our mothers loom with all its pleasant recollections, that the creamery is not destined to take its place among all the improvements of modern civilization and be the future mode of making butter.

ENSILAGE

By JAMES MCCrackEN, JR., *Frostburg Pa.*

(Read at Perry county Institute)

That every age has been characterized by a few men of advance thought and action, regarding the future and its probabilities, is plainly apparent to every reader of history.

That every new enterprise has had its days of "sunshine and shadow;" Its over-enthusiastic admirers and advocates as well as those always ready to criticise and condemn, is also admitted by every fair-minded man.

The men who a few years ago introduced the ensilage system from France to America, were looked upon and spoken of as fools of the first water.

The new process was greeted by a class of men who could see in it a panacea for all their former difficulties and misfortunes a sure preventative and cure for everything from chicken pox to bankruptcy.

It was at the same time set upon by thousands of men who realized their duty to inform their less intelligent brethren on the farm, that this new-fangled sauerkraut business was going to knock the four corner posts from under the American continent. It would ruin all the stock that tasted it, and send their owners to the almshouse or penitentiary. Side by side these two elements of excitement sounded their bugles of nonsense from Maine to California.

That men invested and lost large sums of money in learning how not to build and use silos is undisputed. Gross mistakes have been made. Money, labor and crops have been wasted:

Good and intelligent men have tried and condemned the ensilage system. Yet, "truth, though crushed to earth, will rise again," so ensilage emerges from these years of refining fire and initiatory ordeals, all the brighter and more valuable for having undergone this ripening process beneath the double pressure and influence of those determined to make it a success and those determined to make it a failure as well.

But whatever success or failure may have attended this new method of preparing feed in the past, we only desire to estimate it for what it is worth to us now and in the future. I have no interest in its success or failure other than is common to every farmer in Pennsylvania. To wit: To what extent will it enable us to keep more stock upon a given number of acres or assist us in producing the greatest number of pounds of meat, butter or milk with the least expense of time, labor and capital?

It is admitted by every practical farmer that the margin of profit upon our transactions is entirely too small and any system of growing and feeding a crop that will enable us to keep two animals where but one has been kept before, thus doubling the sales of our product, and the fertilizers to be returned to the soil, should be greeted by every intelligent farmer as a partial solution of the perplexing question, "how to make the farm pay."

Now from this standpoint, what are the facts concerning ensilage? In this matter I shall only speak of what I have learned by actual experience, extending over five years, during which time I have spent considerable time, labor and money, with diversified results. And in this essay I shall only give you the conclusions at which I have arrived, and which I expect to govern my practice in the future.

I. I think I can raise ten tons of ensilage on the same land that would produce one ton of good hay.

II. Two tons of ensilage have a feeding value equal to that of one ton of good hay.

III. All kinds of stock will eat ensilage in preference to hay.

IV. A ration composed of two-thirds ensilage and one-third dry feed and grain, will keep stock in as good condition as it is possible to keep them on dry feed, and will not cost half as much money.

V. All farm stock will eat a good ration of ensilage daily for any desired length of time without becoming tired of it or experiencing any bad results therefrom.

VI. I have feed it to cows in all stages of gestation without any evil effects.

VII. The silo may be filled fast or slow, as is most convenient, and the ensilage harvest may extend through several weeks, if so desired.

VIII. Feeding may be begun in six weeks from time of filling the silo, or may be deferred any length of time desired.

IX. Ensilage is as good feed in summer as in winter, and is, therefore, a safe-guard against frost, or drouth.

X. With a sufficient supply of ensilage in store a farmer may be entirely independent of the pasture field; and is therefore, enabled to keep four or five times as many animals upon a given area of land as he could do by pasturing in summer.

XI. It is inexcusable foolishness for a farmer to pasture land upon which ensilage can be raised, thus allowing one animal to occupy the land that should feed four or five: and then find that his supply of fertilizer is only a fraction of what it should be, and his sales of farm product proportionately small. Then consider the cost of fences, taxes and interest upon land used for pasture, and I think the verdict will be in favor of ensilage.

XII. The feeding value of a crop is not increased by being placed in a silo, but is preserved in a succulent, palatable form, and stock will do as well when fed good ensilage at any time of the year, as they would do if fed a like amount of the same crop when in the condition in which it went into the silo.

This fact enables the farmer to provide for his stock a supply of feed sufficient to last the entire year, and answers the same purpose that pasture does during a few weeks in summer.

It also gives him all the advantages of soiling in summer, without the objectionable feature of having to cut and haul in the needed supply each day, regardless of condition of weather or pressure of work.

The crop is put in the silo when it contains all its feeding value in

the best possible condition and remains in same condition until it is used. It does not require as much time and labor to put a crop into a silo as it does to care for it in the usual way. And it is decidedly easier and cheaper fed from the silo than from the mow and crib.

The feed from the silo is all eaten and if fed from the mow three fourths of the stalks will be refused unless cut and moistened, which will require more time and work than would be required to put them in the silo as they came from the field.

My cattle's mouths always got sore in a few weeks when fed cut stalks dry, which is not true when they are fed ensilage, as it is more the nature of green feed.

On the 26th of August last a five thousand dollar fire relieved me of a splendid barn, with stabling, two silos, one hundred tons of hay and grain, and all my machinery and other equipments for a good farm and dairy, leaving me in the beginning of a Pennsylvania winter with a large stock and not a handful of feed excepting the corn in the field. This naturally raised the question, how to make the best of what I had? The answer was found in having a new silo built and filled before the ruins of the old building had quit smoking. I have been feeding this ensilage since December 1st, and do not regret having built the silo.

Two of my cows which were fresh recently, and have eaten nothing for more than a month but ensilage and wheat bran, are giving thirty-five quarts of milk a day. I do not claim that feeding ensilage without regard to other surrounding influences would cause any scrub cow in the state to give this amount of milk. I think the two referred to were fairly good cows to start with and are in good condition. My cattle have not been out of the stable since November and will not be until April or May.

My stable is a low shed, made of slabs, built beside the silo.

My cattle have not had a pound of hay, straw or corn stalks for feed or bedding this winter. Yet they are clean and comfortable, and look decidedly better than when they were tied up six weeks ago. I have several times kept my cattle in the stable from fall until spring, feeding them ensilage and dry feed combined, and they have always come out in good shape, which, so far as I am concerned, explodes the idea that cows must have daily exercise, several hours freezing, and a big dose of ice water to keep them in normal condition.

I prefer to have a trough of water and plenty of good feed before my cows in the stable, so they can eat and drink all they want and lie down and chew their cuds until the next feeding time. And I will turn them out against any wind fed cows in the state for appearance or solid work.

How to build a silo is the important question, when we decide to try the ensilage business.

I guess there are about as many different plans for building a silo as there are stars in the heavens. And if a man were to attempt to build according to all of them he would strike as long a job as Moses did when he started through the wilderness. And when he would get through, if that time would ever come, he would not know whether he had a silo or an insane asylum.

Knowing full well that I would not have space in one short essay to explain all about building and filling a silo, I have requested Messrs. Silver & Deming, of Salem, Ohio, to send to Mr. McKeehan, for distribution at your meeting, one hundred copies of their "Treatise on Ensilage," which contains a very carefully prepared plan of a good silo,

as well as a full and free discussion of the ensilage question by a number of intelligent and practical men.

Our member of the State Board of Agriculture from Crawford county, Mr. J. B. Phelps, Conneautville, Pa., built a silo last summer exactly upon the Silver & Deming plan, and filled it with corn with an Ohio ensilage cutter manufactured by these gentlemen. You can write him for results.

I use a 13 A. Ross cutter with 30 foot carrier. It will do all its manufacturers claim for it. A two-horse tread power furnished all the power we needed.

It took three good men to take the corn from the wagon and feed the cutter fast enough to control the power.

My essay is already too long and I must omit a discussion of how to grow and handle a crop for ensilage, but success in this as well as the other branches of the business may be measured by the amount of intelligence and skill applied.

ENSILAGE AS STOCK FOOD.

By J. E. ROGERS, *Binghamton N. Y.*

(An address at the Wellsboro' meeting.)

Four years ago we made a statement, based on our experience, that the system of feeding properly conducted could be made to more than double the stock kept on any well managed farm, this was then considered a very radical statement and not a few who knew nothing about it, said it could not be done. But there is now an abundance of proof of this statement and in many instances the stock has been considerably more than doubled. But the next gain by the silo system was a question still to be answered by more experience—and whether we could grow corn continuously on the same ground was still in doubt. But now after four years more of trial we are prepared to make another statement, viz: that the net income of our dairies can be doubled by the proper management of the silo system. Now I am aware that in this case as in the other, those who have had no experience and have had no practical knowledge of this system of feeding, will be the ones to declare in the loudest terms, "it can't be done." The things we know best and on which our judgment is worth the most are those which we have learned for ourselves. But we are sometimes over-positive and very loud in our condemnation of things which we have had no experience and in fact know little about, and in nothing has this been more true than in the history of siloage. Those who have had the most to say against it, and could point out the greatest number of objections have invariably been those who knew the least about it, and just as invariably those who have had the largest experience and were in a way to determine the most accurately as to its advantages and disadvantages have been the loudest in its praise. So do not let us say too positively that the net income of our dairies cannot be doubled by the advantage and changes made possible to us by the silo until we have investigated this subject and can speak with some knowledge of our own. For I am persuaded that not many dairymen who

are following the old lines and are still crying, "sour kraut" whenever silage is mentioned, but are willing to make some changes that will increase the net income of the dairy and help, to restore or maintain the fertility of their farms. As one of the many proofs that the amount of stock can be doubled. On our farm of 178 acres, of which 15 acres is woodland and 25 acres a steep side hill pasture, we are keeping an average of from 90 to 100 cows, 50 sheep, 6 horses and 5 colts, and from 8 to 11 acres of our best land is devoted to growing cabbage and other vegetables for market—and during the past two years, besides keeping this stock we have sold over 30 tons of hay. And the farm by the old system of pasture and dry feed never kept more than 30 cows and 6 horses, with as large a grain expense per cow, aside from what was produced on the farm as it is now costing. We do not grow our grain, but by growing some crop the west cannot produce for our markets we make our acre more than buy the grain that would grow on three acres. Now as to the product of milk received from dairies kept by the two systems. From all we are able to learn from the report of our dairy commissioner and other sources of information on this point, the average yield of milk per cow for the dairies of the state is less than 2000 quarts. per year. Our dairy of 94 cows fed from the silo the year round gave during 1888 an average of 3041 quarts per cow, and for the year 1889 an average of 3175 quarts. per cow. This amount of milk was produced with ensilage and a grain ration costing $\frac{2}{3}$ of a cent per quart for the milk produced or cost for grain of \$25.53 per cow for the year. We do not know of any dry food that will produce this amount of milk with no more expensive grain ration. Now as to the comparative cost of silage with pasture and hay. If you have steep and rough pasture land, that is not easily tilled, I would not advise feeding from the silo the year round, but I would urge having silage to feed short. For the past five years our average yield of corn has been about, 18 tons per acre, the largest yield being 20 $\frac{1}{2}$ tons and the smallest 15 tons, and the average cost of growing the corn, aside from the use of the land and value of the manure (which is produced on the farm) is \$6.80 per acre or 384 per ton. This price represents the cost of labor and seed in, the corn ready to cut and the average cost for five years of cutting the corn in the field, drawing to the barn and cutting into the silo has been, 39 cents per ton. This cost included our teams at \$3.00 per day and our farm help and extra help at its actual cost, also coal for the engine and all expense of cutting the corn in the silo. This makes the entire labor expense of a ton of ensilage ready to feed 77 cents. Our cows average, to eat a little less than 10 tons per year, making the cost of keeping each cow, aside from the grain and use of land \$7.70 per year, our grain ration per cow as stated cost \$25.53 per cow, this added to the \$7.70 makes a total cost for labor and grain of \$33.23 per cow, or in other words cost us last year, besides use of land and wear and tear, \$33.23 to produce 3175 quarts of milk. With pasture and hay it takes about five acres to keep a cow one year. If we can grow, 15 tons of corn per acre we can keep 7 cows on five acres. The ground which grew our ensilage corn this year has grown it continuously for the past six years. The silage I am speaking of, is that produced from a variety of corn which will mature to the roasting stage where sown and grown by planting not more than nine quarts of seed per acre, thoroughly cultivated and cut into the silo without curing. We are so thoughtfully conical that we cannot afford to sow more than nine quarts of seed per acre, that I

want to emphasize this fact. But the chemist and the cow, have demonstrated to us that the stalk grown from this sowing which bears an ear, contains double as much food as the stalk from thick sowing and cut before it is mature. Now we come to a very important item in proving the statement made that the silo will enable us to double the next income of the dairy. It becomes more and more apparent every year that we have to get out of some of those ruts in which, our grandfathers traveled and along which lines they found success. Times have changed and fifty years have brought, no less changes to the successful lines of farming than to other vocations, and I believe one of the causes for much of the complaint that farming does not pay is because so many are still in these ruts. The silo helps us out, and I believe one of the most important changes for us to make is to so arrange our dairies as to make the bulk of our milk and butter during the fall and winter months, instead of during May, June and July. Our markets demand fresh made butter, we can no longer store our summer make and sell it during the fall and winter, at a remunerative price, as our father did—and if sold during the summer it must be put on a glutted market. We receive a price which always goes with such a market. Last spring in our dairy we had but one new milch cow from February to July, and when milk was worth the least we were making the smallest amount of any time during the year. You have never yet been able to supply the demand for choice fresh made winter butter at from 25 cents to 30 cents per pound. Your fresh made June and July butter brings from 14 cents to 16 cents per pound. If the silo makes winter dairying practical is there any trouble doubling the net income under the conditions. I do not believe in taking care of a dairy of dry cows during any month of the year, but I do believe in so arranging our dairies as to, make the least milk when it is worth the least and bring in condition to make the most when it pays best. The silo preserves the food succulent and juicy, which not only insures a larger flow of milk, but a better quality of butter than can be produced on any dry fodder. Another item of great importance in winter dairying is the increased value and application of our stable manure. I believe it is a question, no longer denied by our most successful dairymen that we cannot afford to make milk without a liberal grain ration, taking great care that it is properly balanced with our coarse fodder, the value of our grain is not alone in the increase of milk and better condition of our stock. But it also has a value in our stable manure which we cannot afford to lose sight of. The only chance any one of us has for a crop next year, is in our manure pile, aside from the value we shall extract from our soils in taking from it the elements of plant, food which will only leave us so much the poorer, for the following year. Our farms are of value, not so much for the number of acres, as for the amount of plant food they contain in the three elements of Nitrogen Phosphoric Acid and Potash, and with every pound of produce taken to market we are taking a portion of these elements from our soil. They must be restored or just so much of our farm is gone. With the increase of stock the silo enables us to keep, and the extra value of manure because of the grain fed, which we can make profitable to feed because of the full flow of milk, we are able not only to maintain, the fertility of our farms, but to build them up. But there are certain conditions as, essential to successful farming to-day as is the sunlight to plant growth, and whether we see any advantage in the silo and this plan of winter dairying or not, these conditions we cannot

disregard, and still keep in the race. One of these conditions is warm stables and the stock kept in them during the cold and stormy days of fall, and winter. We cannot afford to subject our stock to freezing temperature and oblige them to use the feed we have given them to make milk to keep themselves from freezing. Neither can we afford to furnish food to heat ice cold water to ninety-eight degrees. Neither can we afford to give our animals a pinched ration, nearly all of which they are obliged to use to sustain themselves, having little or nothing left which they can manufacture into milk for us. Neither can we afford to loose one particle of our manure. Neither liquid or solid by throwing it out under the eves or in the yard, to broach and wash into our streams with every rain. You may say these are small things, but I tell you the profit of all business to-day is in small things, there never was a time in the history of this country when its general business, was carried on with so small a margin or profit, and at so small an expense for the amount of business done as to-day, and every man who succeeds must use every honorable advantage to reduce expense and increase production. The dividends in many of our business interests to-day are in small items of saving, which was wasted or neglected or a few years ago. Competition has produced this result, and it is no less strong in our business than any other, though we have been slow to recognize this fact, it is becoming more and more apparant each year. With these facts before us, that nearly everything we buy is produced at less expense than ever before, let us ask ourselves these questions, what advancement are we making, and how are we using the light and knowledge that has come to us through our experimental stations, our agricultural papers and these institute meetings are we producing any more milk at less expense than we were five years ago, are we using every advantage made known to us in preparing for this close competition, or are we still, in the old ruts, wasting or neglecting the little savings in expense which is the profit to our successful competitor. These thoughts and suggestions are not based on theory but on practical experience, the use of the silo and the lines I have tried to mark out. We have more than doubled the stock on our farm and more than thribled the net income, and if I did not believe there was some advantage, in this system to you I should not be here to advocate it. If you are entirely satisfied with your present condition and what you are doing, don't remember a word I have said, but if you are not satisfied and are getting left in this race and want to catch up, think on these things.

THE MISTAKES OF FARMERS.

By ASHER MATTISON, *New Hope, Pa.*

Read at Riegelsville Institute.

In reviewing the prices of farm produce for the last few years, I am in doubt if a man did not make a mistake in being a farmer at all. But, having chosen that for a business, we will accept the situation as it is, and try to make the best of it. In speaking of farmers, I do not mean those that have farms clear of encumbrance, or have money loaned out upon interest, or invested in bank stocks or other securities, for

they do not make so many mistakes in their business, or if they do, they know how to remedy them.

But I would address this article to those who are poor, renting farms, or owning farms which are only part paid for, and which they would like to pay for and improve, and unto those who have some money and would like to buy a home at these present low prices of land.

I.—THE MISTAKES OF LOCATION.

The location of a farm is a very important thing to a farmer. Is the land productive by nature? Is it well drained? Is it as free as possible from washes and stone which call for extra labor and expense? And, is it well watered? so that the stock does not have to be driven a distance to water in a dry time, which is sure to be a busy one. But far above all these things to the interest of the farmer is the nearness to market.

The question of success, these times, when farmers depend upon milk, eggs, truck and small articles for their profits, depends on whether they can market them themselves or whether they go through two or three sets of middlemen, which means two or three profits between the farmer and consumer. If I were buying or renting a farm, I would, if possible, get one of good land, upon a line of railroad leading into a large city, or upon a wagon road leading into a country town, or where there are manufactories near by. Those buying or renting back from railroads or towns make a serious mistake, for they have to compete with the west in the prices of produce without the advantage of cheap transportation and of cheap and rich lands.

II.—THE MISTAKES OF CULTIVATION.

Let every man grow upon his farm what his ground is best suited to produce and what he can sell at the best advantage, is good advice for any farmer. But don't be bound down by any cast-iron rule of rotation, for I have seen people rotate themselves nearly out of a farm. And don't go against nature, for nature will have her own way in the end. Don't expect to raise corn upon a wet meadow that nature adapted to hay; nor timothy upon a dry hill-side that was intended for clover or small grain. But cultivate your farm in such a manner as a man would run any other business. Manure it with brains, and stable manure, too, and phosphate where you think it will be useful. And don't plow any more than you can manure unless you like to work for nothing. Let the rest of the land be in with grass, which does not need any cultivation. Study which crops are profitable to you, and keep some account of the cost of things and see how you are coming out. Don't make the mistake of knowing nothing about your business, for if you don't know, somebody else will. Don't trust in the Lord to send good crops, for although he maketh the rain to fall alike on the just and unjust, he does not make water run up hill, nor good profitable crops to grow upon poor uncultivated soil. But those that are willing to work can turn the laws of nature to their advantage.

III.—SELLING PRODUCE.

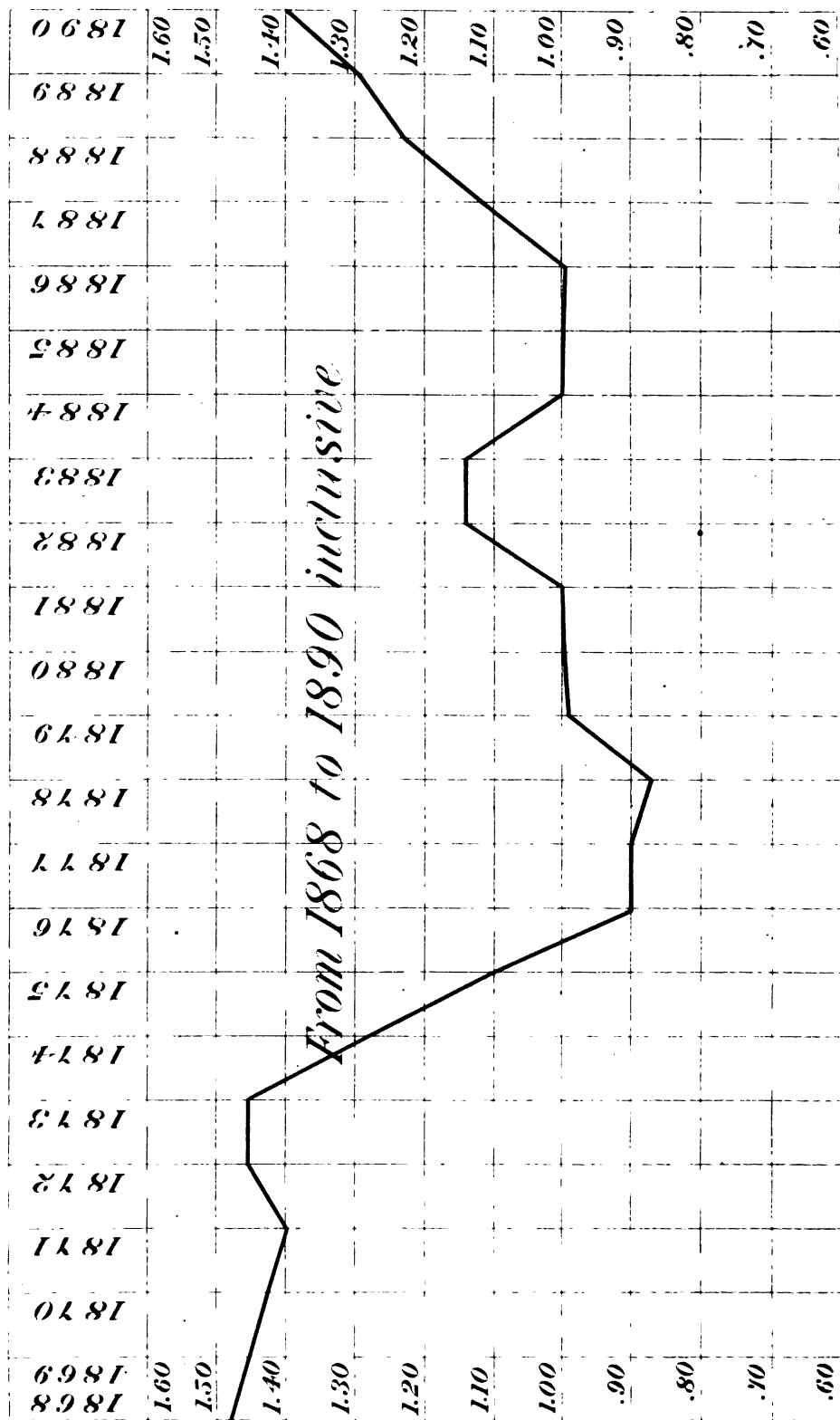
In a general way, sell your produce as soon as it is ready for the market, for at that time, it generally sells to the best advantage, as the eastern farmer has less competition with the west at that time.

Don't speculate in your produce. Men with ten millions of dollars (\$10,000,000) have tried it and failed, and your success is not likely to be greater than theirs. If you can retail your produce, make it look well, for people buy things with their eyes, and no difference how good an article is, if it does not look well, no one will buy it at a good price.

IV.—THE STOCK AND MACHINERY OF THE FARM.

The horses are a farmer's motive power. A manufacturer makes that power as economical and effective as possible, why should not a farmer do the same? He does not need trotting or running horses for they are the property, properly, of gamblers, nor does he need rapid road horses—they are the property of gentlemen of wealth and leisure. But what he does need is a good serviceable horse, sound and of good walking gait and able to work. A horse, like a woman, need not be good-looking to be good. Now comes a matter that many farmers differ about, and which is the rock that many have been shipwrecked upon—the keeping of too many horses. To those that are keeping horses for breeding purposes, I have nothing to say; for that is a part of legitimate farming. But why should a farmer keep five horses to do the work of four, or four to do the work of three? A manufacturer does not keep four engines to do the work of three, nor the merchant four ships to carry the load which can be brought in three. But, says the farmer, it is so convenient to have four horses, I can get my work done sooner, and they are handy to have. As far as getting the work done sooner is concerned, if he had managed better and got at it in better season, he would be done just as soon. And as to being handy to have, so are bonds, bank stocks, and a great many other things. A horse costs one hundred dollars a year to keep—counting feed, care, and depreciation in value, and if you can get your work done just as well with one less horse, there is more than that much saved, for the farmer would not have a horse to drive to every public affair that was going on, and to which he had no business and which cost time and money. I have in my mind at present a farmer who is rich, with plenty of money invested, who cultivates his farm with two horses and does it well. And on other farms of the same size, where the tenants complain of hard times, and owners can scarcely meet their interest, three or four horses are kept to farm, not nearly so well. Keep as few horses as are necessary, and keep good ones. Don't keep two or three worn out ones to do the work of one. Feed them well. I think it would be better if farmers in this part of the country raised more horses and sent less of their money west for them. The manner in which most farmers buy horses is one of their mistakes. The fashion in this part of the country is for a dealer to have a public sale; advertise largely; have the horses fed or puffed up to look in the best possible condition; give credit, and sometimes conduct the sales in such a manner that they are open to doubts as to fairness. The farmer goes to the sale with little more chance of learning the natural condition of the horse he buys, than he has of learning the construction of the moon. The dealer recommends the horse as all right. The farmer gets excited in bidding and gives \$15 or \$20 more for the horse than he would at private sale. Then he gives a negotiable note, which is soon passed into the hands of a third party. If the horse turns out good, all right, if not it is the farmer's loss. Suppose, instead of this way, he buys the horse at private sale and gives a non-negotiable note for thirty days, until he has an oppor-

FARM WAGES BY THE DAY, WITH BOARD, NEAR PHILADELPHIA, FOR 46 YEARS. NO. 2.



tunity to see the horse work. If anything is the matter he will be in a much better position to obtain redress.

The cow is the farmer's manufactory which turns his raw material into a manufactured product, and the kind of cow kept depends mostly on whether they sell milk or make butter. But I contend that good cows are as profitable for a creamery as for anything else. If he cheats the creamery with poor milk, he cheats himself with a low price, and wonders what is the matter with the creamery men, that they don't get more butter per hundred pounds of milk, when it was never there to get. It is a puzzle to me what half the farmers keep cows for. It is not for milk, surely, for some keep twelve or fifteen cows and go to creamery all winter, with twenty or thirty pounds of milk a day and are too ignorant to discover their mistake, or too lazy to remedy it if discovered. But they can stand around the creamery until nearly noon and tell how poor farming is and how little money they get, when they don't try to have anything to sell. Don't buy poor cows because they sell cheap, they are dear at a gift. Don't buy old worn out cows, for they get worse, and cost more to keep. Don't buy a cow just because she will make a big beef. It is not profitable to feed even young steers for beef in this part of the country. Raise some calves from your best cows, sire by a bull from a good milking family. Give the cows enough to eat if you expect to get anything from them. I believe that three-fourths of the cows in Bucks county have never had enough to eat for one whole year at a time in their lives. Don't make them travel all day to get enough to eat, for a cow is not a horse and was never intended for road service.

Carry water to about ten thirsty cows some hot summer day, then you will know how much it takes, and after that provide plenty and some to spare. Try to make your dairy profitable, if you can't, sell to some one who has sense and industry to do it.

If you keep hogs feed them well, for there is nothing in a hog but what you put there, and the man who gets a hog to weigh three hundred pounds in the least number of days, generally gets the most profit out of him. Don't turn him out to shift for himself, for although he may be able to do that, he will not shift for you worth a cent.

Don't despise poultry as a small affair. This is the day of small things, and when a dozen of eggs brings as much as a bushel of oats and don't cost half as much to produce, it is best to turn the oats into eggs. Provide a good place for the hens in winter. Don't let them stand around in the snow and warm one foot at a time, for it is expensive for the farmer and cruel to the hens.

Pigeons also are profitable and furnish a good way for the boys to earn some money. I know of a young man who sold \$300 worth of squabs last year at an expense, for feed, of \$100, leaving a profit of \$200. And I think there are farmers in this county (to whom) if they have \$200 left the coming first of April, it will look, at least, as large as the mountain in the moon.

Buy good farm machinery of a dealer of known reputation, one near at hand preferred. Buy as little as you can get along with and take care of it after you get it. Don't buy a harvester on a 50 or 60-acre farm unless you are rich. In that case of course it is all right, for rich people ought to put some of their money in circulation. Don't buy old worn out machinery at public sales and pay twice as much as it is worth, for a machine is like a can of milk—cream on top, and the first use is the cream. Don't buy anything of the smooth-tongued agent

that comes around to sell farmers everything they want from a harvester to cloth to make him a new suit of clothes. In such cases the fool and his money are soon parted.

Carlisle said that England was inhabited by twenty millions of people mostly fools, which might aptly apply to the business management of most farmers. Be prompt in your engagements. Sell mostly for cash and buy the same way. Nothing limits a man's extravagances more than the fact that he is to pay cash when he gets the thing bought. Don't give your note for merchandise due three, six, or nine months hence and then thank the Lord that the bill is paid.

Don't move every year, for it takes five years or more to understand a farm, and if you move every year you will not understand any of them, and very likely, in the end have nothing to farm with. Besides moving is expensive.

Don't go to every public sale in the neighborhood, but when you do go, be careful what you buy. Don't bid at what you do not want. Public sales of stock, farm products and trash lead the farmer into an extravagant manner of buying things. Buying what you do not need because it looks cheap. Bidding more than you would otherwise give because you are excited.

Keep out of debt, for although your property may shrink in value, your debts are never affected in that way.

Consult your wife about your business affairs, maybe she knows better than you, and if she doesn't, it won't hurt anyway. Generally two heads are better than one, and often the man's is the cabbage head.

If you have any money, keep an account in bank, and if you have not, save some to keep an account with. It is much easier to take five dollars out of the drawer to spend than to draw a check for that amount. Besides money in bank goes into the business of the country, while money locked in a drawer does no good until spent. A bank will take care of your money for nothing, and the more you give them to take care of the better they will like it. Establish a credit with a bank, then if you need money at times, with proper endorsement or collateral, you can always obtain it. When you give a note in bank attend to it promptly, at maturity. Borrow what you need directly of the bank. Don't give notes to Tom, Dick and Harry for this, that and the other, making an increased number of notes going through an increased number of hands to the injury of your credit. Avoid note shavers as you would the evil one, for, like leeches, they will drop off when they are filled and the last drop of your money is gone.

Farmers are the born complainers of the world. If it is one degree too cold, everything will be ruined; if too hot and dry, things will be scorched and dried up, and last summer everything was washed away. If instead of complaining afterward we make some preparation for storm and failure, it would be a great deal better and they would not affect us so seriously when they did come. Don't expect all good crops of all high prices; low prices have come to stay and we will have to adjust ourselves to them and help ourselves by trying to cheapen production. Instead of complaining set your wits to work to study some plan to get over or around the difficulty and you will fare much better. You have the same chance to do business that other people have. There is just as much money made in a million dollars' worth of farm business as there is in the same amount of manufacturers' or merchants business. Only in the farm business the million is divided among a thousand instead of one or two, and far better it is for the country, that it should be so. So quit complaining and go to work.

THE BY-PRODUCTS OF THE DAIRY.

By F. K. MORELAND, *Ogdensburg, N. Y.*

(An address at the Atglen Institute.)

The different stages of this world's progress and existence even from the beginning of time have been characterized by the spirit of invention.

The man who first fashioned a rude stone ax was the greatest benefactor to his fellow man of his time, for he introduced a newer and higher civilization upon which we look downward and backward as the stone age. The man who first fashioned a bronze sword must have been considered a god by his fellows, so great was the improvement of the bronze weapon over that of stone. But the first, imperfect bronze weapon was the beginning of a still higher era of civilization, and the inventive artisan who first made a bronze sword was in his time and to his people a public benefactor.

While we are too apt to underrate the importance of these earlier inventions, yet they prove that man has been an inventive animal since his existence. It is a long stride in the material prosperity of the world from the stone age and the bronze age of whose inventions no protecting patent office has preserved to us the records, to this the age of steam and electricity, when inventions crowd each other into existence with such unseemly haste, that the present century deserves to be called the age of invention. I doubt if the young man of to-day, riding in palace cars at the speed of 50 miles per hour and with all the comforts of a hotel, able to send a message from London to New York and have it read five hours earlier, knows that there are men living to-day who are older than the steam railway, the ocean steamship and the telegraph, to say nothing of the telephone, typewriter and electric light. The inventions of the present time are so numerous, so great and remarkable that they have actually ceased to be remarkable. The inventive genius of the citizen of this great, broad, progressive country is so ample for our needs, working as it were miracles before we have felt the first throb of expectation, much less the pangs of need in that particular direction, that we are too prone to keep our eyes turned inward rather than watch as we should the people of other countries. And perhaps we are right, for the inventions that have had their birth in this country and have been given to the world, making life pleasanter, man better and nations happier, are a sufficient excuse, if excuse were needed, for our existence. It was needed at Boston, with its Boston Common to provide a field for a Franklin, in which with his kite to capture the lightning and to-day electricity is all around us. Given a John Ericsson, it was needed an America as a condition to the production of a Monitor, and it is the country that could produce an Ericsson that the "Cute Yankee" must watch with a jealous eye, or he will lose his prestige and be forgotten by the surprises to the world of which Sweden is capable.

When the statement is made that the Swedes are an inventive people, how few there are, at least in America, prepared to accept the statement without at least a grain of salt. Yet the statement is true. The Monitor and the screw propeller now so common, are the results of the great Ericsson's genius. These are the greatest and most important of inventions, but in all the range of inventions down to the most unimportant of trifles, the Swede has a foremost place.

When we come to the dairy industry, our Swedish friends have literally "carried coals to Newcastle" in furnishing us with improved methods and labor saving appliances. While our inventors have given us innumerable forms of churns, good, bad and indifferent; pans for setting milk of all possible varieties, and butter packages too numerous to mention; our Swedish friends have aimed at the discovery of hidden principles and have endeavored to accomplish startling innovations. Centrifugal separators were not invented in America and two of the most important of these inventions are the product of Swedish brains.

It seems to me that in the unequal struggle of wresting a livelihood from a rock bound and barren soil or from the depths of treacherous seas, the hardy Norseman's intelligence has been most abnormally sharpened and he has thoroughly understood the art of supplementing by invention what he has found to be the ordinary conditions of his national surroundings. Perhaps no invention has been of equal importance to the dairy industry, certainly none that I now recall exceeds centrifugal separators, and while that invention is yet a child in swaddling clothes, it is superannuated. While few separators in this country are worn out, they have already lived out their usefulness and the separator must take its place with the old fanning mill where it was placed when grain separators and threshers were introduced, and the sickle and grain cradle, untouched since reapers were brought on the farm.

It does not require great age to remember the old time harvest work when the field of wheat was harvested with the sickle by men, women and children cutting and binding the golden grain, which was hauled to the barn to be threshed out with the flail, everything done by hand, and now, the same machine that cuts threshes, and the grain is taken direct to the granary—so great has been the progress of a few years.

And in the dairy, cream is no longer a resting place in the journey of milk from the cow to the firkin, for the Swedish dairy inventors not satisfied with the achievement of wresting by force the cream from the milk, avoiding the old slow process of raising, making useless the vast array of pans with attendant labor, have demonstrated that there is no necessity for cream, that the force that will compel milk to give up its cream will furnish us the butter direct; and while this Swedish "short-cut" of extracting butter is still young, we have still another and one which I believe I have the honor of first describing to a Pennsylvania audience.

I had the pleasure of spending five months during 1889 in Sweden. The extractor had not then been introduced in America, and as I knew nothing of it was of course on the *qui vive* to learn, and here is what I learned—that the process of extracting butter direct was already being considered of minor importance in view of a still later invention, which was nothing less than a process giving value to a hitherto almost worthless product—skim milk and whey, the entire refuse product of the dairy. Surely we live in an age of progress. One invention in 1889 makes an entire revolution in the process of butter-making, and another invention steps in and increases manifold the value of the entire waste product of the dairy. In regard to this new process in dairying, I will give the results of my study in Sweden, and let dairymen judge for themselves. Suppose the creamery has a large quantity of skim-milk. Now and heretofore this had no other use than as food for calves and swine, and as such a value under the most favorable circumstances of but about two cents per gallon, but our Swedish friends want more, and they handle it not as a refuse product but as a wealth producer.

This process is, to take a portion of this skim-milk and curd it, as for skim milk cheese, but at a higher temperature and with a larger amount of rennet to make the precipitation more complete. These curds are then put in a common cheese press and pressed, but at a much greater pressure than for cheese and the product is dried and ground, making what the inventor has called "casein."

This casein containing a very high percentage of protein is valuable as an ingredient in feeding cakes for cattle, horses, hogs and poultry.

By mixing a small percentage of this nitrogeous casein with cheaper kind of grain, milling offals—valuable feeding cakes is produced, and there is hardly anything in the form of feeding cakes where this substance will not yet play an important part.

Still more interesting, however, is a secondary process, but one of primary importance.

The whey from the process already described is mixed with the balance of the skim-milk, or in other words, the whey and skim-milk are mixed in nearly equal quantities and evaporated, the result being a nearly solid water-free cake. Everything that was an element in the milk or whey has now been reduced to this substance and is ready for the process by which it is to be utilized. This substance is called "lactoserin," and is cut into small cubes and roasted and ground. In this state it is used for mixing with coffee, cocoa, and different beverages, various human foods and pastries. Swedish physicians of acknowledged repute have highly endorsed the value of this product as used for these purposes. From my own observations I have no doubt of the importance of this process—I believe it is to become a great factor in the dairying industry. In regard to the question which all dairymen will ask, first, what is the profit? I will say, three gallons of skim-milk will produce one pound of "casein," and three pounds of "lactoserin." The manufacturers of feeding cakes in Sweden pay four cents per pound for the "casein," and cocoa manufacturers pay five cents per pound for the "lactoserin," making nineteen cents for three gallons, or six and one third cents a gallon for a raw material which I question has hitherto been worth to exceed two cents per gallon. While I am unable to give an idea of the cost of this process, yet I believe it is quite inconsiderable in comparison with the results to be obtained. The individual farmer can estimate for himself the results that will accrue to him individually, when this process has been placed within his own reach and it needs but a glance at statistics to appreciate the results to the dairy industry. There was produced in this country last year, about 1,300,000,000 lbs. of butter and 450,000,000 lbs. of cheese, allowing two gallons of skim milk to each pound of butter and about one gallon whey to each pound of cheese, the waste of wealth that will be arrested and turned into useful channels may be easily understood.

And in conclusion I may add that it is a source of gratification to me that at last our dairymen have the prospect of being able to utilize, and in a profitable manner, all the valuable milk sugar and salts heretofore wasted, and the magnitude of the dairy industry, providing as it does such vast quantities of the raw material for this new manufacture and the marketable product itself having all the nutritious qualities of skim-milk condensed, will furnish in many cases cheaper articles of food will thus prove an unmixed blessing to consumers. The extent to which this process may become a great industry in this country, will benefit many classes and none more than the farmer. Such an invention could never have been more welcome than at the

present time when dairying offers but a slight margin for profit, and is a promise that the dairy industry of this country will enter upon a newer and brighter era, and compensation be more in accordance with the labor performed.

ECONOMICAL MANAGEMENT OF POULTRY ON THE FARM.

By JOHN S. COPE, *Germanstown, Pa.*

(Read at the Hatboro' Institute.)

"Don't count your chickens before they're hatched;" or better still don't count them till they're raised and sold and you have the money in your inside pocket, and then if you like, you may count that. It won't take long and time is money.

I have chosen the title which I adopted for this paper for several reasons.

First.—Because the poultry question in all its bearings is too large a subject to do justice to in an essay of this length.

Second.—Because it is to be read before a Farmers' Club.

Third.—Because a farm is the proper place for the successful cultivation of poultry.

Fourth.—Because farmers, as a class, are experienced in the care of live stock and more or less familiar with the habits and wants of domestic animals.

Fifth and lastly.—Because a little knowledge is a dangerous thing, and for want of a little more of that scarce and valuable commodity many farmers make a failure of the poultry department where they have every natural facility for making a success of it. That a farm is the proper place to raise poultry is now recognized by all the most successful breeders of fancy stock, and their premium winners are usually raised on farms. It is to be feared that many farmers don't know how to improve these privileges, nor have they much idea of the extra labor and expense involved in keeping poultry on a limited amount of land.

We are accustomed to speak of domestic animals as distinguished from those in their native or wild state; but what do we understand by the term domestication? It means simply that certain animals, by force of circumstances, have become dependent on man for their food. All domestication, either of animals or savages, is through the medium of the stomach, and without this powerful lever to work with we should find the domesticating business very up-hill work. Our most intelligent domestic animal, the dog, still retains all his original instincts and habits. You may keep your French poodle in the parlor and feed him from your own plate, but turn him out of doors, and no amount of bells around his neck or blue ribbons round his tail will ever dissuade him from hunting up some stale piece of meat or old carcass and burying it for his Sunday dinner. The question which we want to settle right here is, "How far is it expedient for farmers to domesticate their poultry?" Chickens and turkeys are probably the least civilized of any of our farm animals and this is quite right and proper. They are adapted by nature to provide their own living if the conditions are favorable. But what are these conditions?

First.—That they be not required to lay more than two sittings of eggs in a year, as in their wild state.

Second.—That they be kept in a climate where insects are plentiful all the year round.

Third.—That you don't allow more than six or eight head to the acre.

Fourth.—That they have liberty to wander in perfect security as far as they please. When these conditions are all complied with the unfed, beggarly farmer's hen may begin to enjoy life. But don't go to the other extreme. We can't abuse an animal worse than by constant over feeding. It weakens their constitution, it lowers their self respect, they become sluggish and a target for the first disease which comes along. All animals, in common with the human variety, are lazy, and will seek their food where it can be obtained with the least possible exertion. Throw down a pile of cut grass near a cow, and no matter how good her pasture may be, she will stop grazing and begin greedily devouring the cut grass.

Just so with a hen. Therefore, I say make your hens scratch for it, provided it is there to scratch for, but if there isn't enough to go round you need not expect your young birds to grow or your old ones to lay eggs on half rations

The whole secret of making young chickens grow is to keep them on the war path. There is no trouble about this on a farm, they have every inducement to go to work. There is something to be chased after or jumped for or scratched up on a farm nearly all the year round. Ask the farmer if he hasn't found it so himself. And here we have the scientific explanation of the well-known fact that young chickens when kept in large flocks will not thrive. After they have exhausted their foraging ground and it gets to be all work and no play, they soon become discouraged and hang around in groups in a pensive and most unhappy state of mind and body. This unhappiness does not arise from hunger or from over feeding, but simply from idleness. They are denied their ancient privilege of following out their own instincts, or in other words, have become a domestic fowl. Therefore don't overstock your ground but give your poultry a chance to develop bone and muscle in the way their creator intended them to. Of course in feeding you must be governed by weather and temperature. That they will require and consume more food in cold weather goes without saying.

After a heavy rain the earth-worms come to the surface of the ground, and then your hens will require little if any artificial feeding. During a dry spell they will retire into the damp earth below and *thin* earth worms are out of season and command a high price. When your wheat or corn crops are being harvested the chickens will not suffer much from neglect, but don't imagine because you have a little wheat chaff on your barn floor that it will last them till snow comes. They will probably have all the grain out of it inside of a week's time. One of the largest egg dealers in Philadelphia told me that about the time of wheat harvest eggs were plentiful. That means that the hens have something to work on. Then, why not feed them a little wheat all the year round and keep at it; it will pay you well. Although a free-trader in politics, I strongly advocate the protective policy in the poultry yard and the encouragement of home industry.

Let one person in the place have entire charge of the poultry department. Have your hens as tame as a house cat and never frighten them unnecessarily. Never throw any scraps out of the kitchen door, or your

hens will hang round the house all day waiting for something to turn up. For this reason I object to the farmer's wife taking care of the poultry. She is about the place nearly all the time and they are continually watching for her when they ought to be in the barn yard or in the fields, and so become a nuisance about the house. The person who attends to the poultry should be out of their sight most of the day and they should be fed as far away from the farm house as possible. I mean no discourtesy to the fair sex, but merely wish to suggest a great improvement in the time-honored custom of feeding chickens in the back yard. Build a house for your flock where you can winter them comfortably so that you will not be obliged to run all your poultry into market on the first approach of winter but hold on for the high prices of February and March. It will not cost over 25 cents per head to feed them during the three winter months. Young roosters should gain two pounds during this time and be worth from 25 to 50 cents more clear profit by the end of winter than if sold at Thanksgiving time when the market is always overloaded. Every farmer who undertakes to keep poultry at all should have a poultry house worthy of the name. If necessary put as much money into it as you would into a new cow stable. Make it weather proof, man proof, rat proof, dog proof and every other kind of proof. You can easily do this without going to any great expense. What economy is there in having half-grown chickens killed or stolen after all your trouble in raising them?

The form of house which I should recommend above all others is built in the shape of a shed, facing due south, and constructed of the cheapest material, so long as it is proof against wind and rain. The length of course, will depend on the size of your flock. I should make it at least six feet high in front and four at the back, and divide it into four rooms or compartments, with solid partition walls between. Have an ordinary sized window and a door opening outwards in the front of each room. Please remember we are not building a green house. The moon is very beautiful, no doubt, but can't be depended on for much warmth on a cold winter night, and the February sun, which made all the hens perspire in the morning, is now on the other side of the earth. The man who keeps his chickens in a green house will find them taking the grip regularly every morning. The western room will be your roosting house or dormitory. Put one hot bed sash in this end with the bottom very near the level of the floor, and protected from injury on both sides by two-inch mesh wire netting. This will give them the full benefit of the afternoon sun till it sets. Make your perches of shingling lath and moveable; about three feet from the ground and all on the same level, so that there may be no emulation to get into the upper gallery. Don't leave a crack or hole, however small, where a draught of air can blow on the roosts. Ventilate entirely from the front and regulate according to wind and weather. Make the whole front of this apartment moveable, so that in hot weather it may be converted into an open shed. Have no unnecessary wood work, joints, or crevices where vermin can harbor, and should they put in an appearance take the perches right out of doors and promptly annihilate them with kerosene oil or whitewash. A cement floor directly under the roosts sprinkled over with a little dry earth or air slacked lime will make cleaning up an easy matter and keep the place disinfected. Store all manure carefully in a dry place. It is so much money in your pocket and makes a splendid fertilizer for grass.

The next compartment in order will be for laying hens. Have a good

sand floor and place the nests without bottoms on the ground, covering them by a sloping shelf or lid fastened by hinges to the wall with the outer edge coming nearly to the ground and allowing room for the hens to pass between the boxes and the wall. This lid, or rather these lids, can be raised when necessary and fastened back against the wall by a turnbuckle. They are made of light half inch box boards. You can make your nests of old soap boxes with the bottoms knocked out and cut in two lengthwise, with a little straw or pine shavings in the bottom. Adjoining this room is the hatching room which is an exact copy of the one I have described, so that the clucking hens will not know the difference when transferred from one to the other. I have the nests in my own hatching house made so that I can fasten the hen on for the first twenty-four hours, or if necessary, I throw a piece of bagging over nest and all which has a very soothing effect. After a few useless struggles for liberty the most cantankerous hen will generally give it up and settle down to business. A very good plan is to darken the whole room by drawing a curtain across the window. If any eggs are broken the others must be carefully washed with tepid water, but this does not often happen as my nests will only accommodate one hen at a time. There are no reserved seats, the tickets merely entitling the holder to a seat on thirteen eggs.

Wheat or wheat screenings is the best food for setting hen, corn is too relaxing. If well fed and watered while incubating they will set contentedly, but a hungry or lousy hen will always give trouble. Be very particular to have plenty of loose earth or sand on the floor for them to bathe in, if not, you will have lice on your young chicks and that means a high death rate. I have dwelt very minutely on some of these precautions, because if neglected they mean failure. As soon as you find the first egg chipped fasten your hen on the nest and then let her severely alone. You may go to town as far as that hen is concerned, but when you are fully convinced that every hatchable hen egg has been converted into a chicken, you may venture to remove hen and brood to a coop. Now is the time to mark the chicks, if desirable, by cutting the web of the foot between the toes with a sharp pen-knife. They will carry this mark for life. Never give a hen more than fifteen chickens to brood; you will have more chickens at the end of the season, if you will follow this rule. If the weather is cold let every hen have the chickens which she hatches herself. "The longest way round is sometimes the shortest way home".

But we left the chicken house only half finished, or, perhaps it is finished after all, for the eastern end is nothing but an open shed, where the fowls can sun themselves and take their regular dust bath every morning. The floor is covered with sand or sifted coal ashes to a depth of four or five inches. When snow is on the ground all their grain may be thrown here, which if ground fine will keep them busy scratching two or three hours every day. Exercise in winter is indispensable, as it not only stirs their blood but prevents feather eating and other bad habits bred of idleness. I have wintered upwards of a thousand birds and never had a single case of feather or egg eating among them, though these are common complaints where "Satan finds some mischief still for idle hens to do." Feed all soft food on clean flat boards outside of the house if possible. Keep them well supplied with gravel and clean water, and if you have any skimmed milk, don't give it all to the pigs, every drop of milk, will be turned to good account by your hens. Give them plenty of clover hay or sweepings from the hay mow,

corn fodder, turnip tops, small potatoes, either raw or boiled, cabbage trimmings, apple parings or almost anything that is usually thrown to the pigs. All these things take the place of green grass or clover, which in summer forms more than half their diet and is necessary to help them digest their grain. When the ground is frozen and worms are not to be had at any price, you must supply the demand for animal food in some other way or winter eggs will be few and far between. By observing all these directions carefully the cheerful lay of the hen will greet your ears from the 1st of January till the 31st of December.

And now we must return to the brood of newly hatched chickens which we left in the nest. Put them with their mother in a good tight coop with slat front on or near a grass plot. Place a board about a foot wide in the back of the coop and in the forepart throw several shovelful of sand or loose earth, so that the hen may give them their daily dust-bath. This is just as important for them as it is for a baby to be bathed with water. To the front of the coop attach a lid by means of hinges which can be closed at night or in stormy weather, and when lowered will serve as a platform to feed them on. Give them clean water to drink from the first day, in a tincup three inches high, made by cutting an old tomato-can in two. They can easily drink from this without getting into it and will not drink too much at a time if not allowed to become very thirsty. By all means substitute milk for water if you have it. I have raised many a weak chick which owed its life to a little skimmed milk. For the first two weeks keep them supplied with fine cracked corn and a little whole wheat thrown into the coop, and let the hen feed them as often as she thinks proper. Never let them get very hungry and then allow them to gorge themselves with grain; many are lost in this way. If they have grass it is not necessary to feed them any mixed food, but if you keep them away from the grass they will not thrive on hard grain exclusively. If you prefer mixed or ground feed use as little water as possible in mixing it or use a little milk but never allow any to lie around uneaten as it very soon becomes sour and will cause disease. Finally never use fine meal or anything that will form a paste but the coarsest kind of feed meal mixed with about one third coarse bran. With this treatment you will not be troubled with gapes. I have raised thousands of young chickens and never had a case of it.

After the chicks get strong enough to forage for themselves, three times a day will be often enough to feed them. Let the hen stay with them till they are two months old, and never mind if she commences to lay eggs in the coop, providing she does not take a dislike to her brood. If the coop is kept clean the hen will not suffer and she will protect them at night. Keep them free from lice and be ready to warn them in case of danger. The best chickens are raised in this way. Two or three days before removing the hen put one or more perches in the coop near the ground, made of a single plastering lath loosely tacked in and she will teach them to roost before leaving them, and as soon as they grow large enough to crowd the coop and get overheated at night remove them to a summer roosting house provided for the purpose. This should consist of a simple rough shed about five feet high in front and three at the back, made to accommodate not more than fifty. Several of these scattered about the place will be much better than one large one. Be very particular to allow no openings in back, roof or sides, but have the front made of one-inch mesh wire

netting and close them carefully at night. These houses will afford shelter in stormy weather besides being a secure resting place at night.

And now that the crop is safely harvested, I will bring these lengthy remarks to a close. To many of you there may be very little news in them, but if some of my dearly bought experience should prove of any value to any one present, my reward will be sufficient. I have not touched upon any topic which did not properly belong under the heading of this essay. I have said nothing about turkeys, geese, ducks or any other species of domestic birds. I have left the breeder of fancy poultry out in the cold. I have dodged the incubator question. But when I assert that a book the size of Webster's dictionary would not contain the things which might be written on these and kindred subjects, you will no doubt cheerfully overlook my shortcomings and release me from their discussion at this time.

TABULAR STATEMENT OF THE RECORD OF THE WEATHER FOR 1890.

By J. I. HEACOCK, Esq., Meteorologist of the Board, Quakertown, Pa.

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Averages and amount of rain fall, etc., for the year.
Highest temperature,	69.5	69.2	73.2	81.7	80.7	89.7	95.5	89.7	87.2	76	62.5	51.5	77.2
Lowest temperature,	14	14.7	3.5	21.7	31	46.2	41.7	43.5	33.5	21.7	18	5	24.5
Average temperature,	37.2	36.4	33.8	48.3	59	69.3	69.7	68.4	62	50.6	41	27	50.2
Greatest temperature,	46.6	46.2	43.1	60.7	70.8	81.2	84.7	79.3	74.1	59.9	51.2	36.5	61.2
Lowest temperature, mean,	27.9	27.9	24.8	34.8	46.9	56.5	57.5	58.5	51.9	42.5	30.1	17.6	39.7
Daily range of temperature, greatest,	39	32	39.2	46.5	37	36	37.2	32.5	35.7	30.5	34.5	28.3	35.6
Daily range of temperature, least,	9	7	9	5	12	11	7.5	12.2	7	6	9	8.2	8.6
Daily range of temperature, average,	19.3	18.1	19	22.3	24	24.6	24.7	21.1	22.2	17.5	22.2	18.9	21.2
Monthly range of temperature,	55.5	54.5	69.7	60	49.7	44.5	53.8	46.2	53.7	54.3	44	46.5	52.7
Barometer, highest,	30.74	30.58	30.57	30.61	30.28	30.94	30.26	30.24	30.88	30.34	30.45	30.62	30.45
Barometer, lowest,	29.68	29.62	29.62	29.58	29.60	29.75	29.72	29.64	29.59	29.34	29.62	29.53	29.62
Barometer, average,	30.21	30.13	30.12	30.12	29.98	30.00	30.04	30.03	30.13	29.93	30.08	30.09	30.07
Barometer, daily fluctuations, averaged,	21	19	15	15	12	11	08	10	07	14	14	21	14
Amount of rain fall and melted snow,	3.19	5.18	8.31	3.22	6.56	3.13	5.50	5.86	4.82	7.25	1.24	3.21	57.47
Number of days upon which rain and snow fell,	14	12	16	10	12	6	15	14	10	17	7	11	144
Number of days fair,	9	8	4	10	6	8	5	6	8	1	9	9	83
Number of days clear,	4	3	5	10	8	10	10	5	11	6	10	7	89
Number of days cloudy,	3	5	6	0	5	6	1	6	1	7	4	4	48

REMARKS.—Height of rain-gauge above ground, six feet. Barometrical observations reduced to freezing point and to sea level. Height of ground above sea level, 526 feet. Location of station, latitude $40^{\circ} 28' 29''$, 35 north. Longitude $75^{\circ} 20' 59''$, 87 west. Mean relative humidity of the air, 79.3 per cent. The maximum power of the sun's rays, 120.3 degrees, as expressed by a solar radiation thermometer ten inches above grass. Crops during the year, up to the general average yield.

TABULAR STATEMENT OF THE RECORD OF THE WEATHER FOR 1890.

By Major FRANK RIDGWAY, *Meteorologist of the Board, Harrisburg, Pa.*

	January.	February.	March.	April.	May.	June.	July.	August.	September.	October.	November.	December.	Remarks.
Average barometer (inches).	30.25	30.13	30.08	30.14	30.98	30.00	30.04	30.05	30.15	29.95	30.11	30.11	All barometer readings corrected to sea level; station has an elevation of 277 feet above mean tide at Sandy Hook, N. J. Total amount of rainfall during year 1889 was 57.07 inches; for 1890, 42.63 inches. Mean temperature for year 1889 was 51.8 degrees; for 1890, 52.4 degrees. One foot and three inches of snow fell during December, 1890, more than has fallen in many years.
Highest barometer (inches).	30.73	30.60	30.60	30.64	30.29	30.36	30.30	30.27	30.38	30.37	30.41	30.63	
Lowest barometer (inches).	29.71	29.59	29.46	29.53	29.60	29.77	29.72	29.76	29.80	29.43	29.63	29.67	
Highest temperature (degrees).	67	74	73	81	79	92	96	88	86	76	64	55	
Lowest temperature (degrees).	15	18	8	28	38	51	50	50	43	34	22	14	
Average temperature (degrees).	38	38	26	51	61	73	77	71	64	53	43	29	
Average of the highest temperature.	46	45	42	61	70	82	82	79	73	60	50	35	
Average of the lowest temperature.	20	31	29	41	52	63	63	63	56	47	36	24	
Greatest daily range of temperature.	30	36	31	37	30	32	29	24	30	25	26	23	
Lowest daily range of temperature.	4	4	4	3	9	4	5	6	4	3	6	4	
Average month range of temperature.	15	14	13	20	18	20	16	16	17	13	14	12	
Average percentage of humidity (moisture in the air).	80	78	74	62	66	65	64	73	78	76	72	78	
Amount of rain and melted snow (inches).	2.01	2.39	3.80	2.46	6.61	2.97	2.86	5.70	2.89	6.40	1.12	2.42	
Number of partly cloudy days.	10	12	16	12	13	11	10	12	9	8	9	8	
Number of cloudless days.	5	3	5	12	6	10	11	10	10	8	11	10	
Number of cloudy days.	16	13	10	6	12	9	10	9	11	15	10	13	
Number of rainy days.	14	11	14	9	17	10	10	15	11	15	8	12	
Prevailing wind.	NW.	NW	NW.	NW.	E.	W.	W.	W.	E.	W.	W.	W.	
Highest wind (miles per hour).	42	36	48	36	36	39	36	36	24	26	36	64	

THE WEATHER FOR 1890.

Prepared by Wm. A. KELKER, Esq., Harrisburg, Pa.

1890.	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Cloudy.	Rain.	Clear.	Rainfall.	
January. . . .	R	R	C	R	R	C	R	RS	O	R	R	C	C	O	R	S	O	C	R	R	S	O	S	S	C	R	C	C	O	C	C	10	16	5	2.01	
February. . . .	C	S	R	R	O	C	S	RS	C	S	S	C	O	R	O	O	C	R	R	RS	S	C	C	R	R	C	R	R	C	C	C	9	15	4	3.39	
March.	S	O	O	C	S	S	C	O	R	R	R	R	R	R	S	S	S	R	S	C	R	C	C	R	R	O	R	R	S	S	R	5	21	5	3.80	
April	O	O	R	R	O	O	R	R	C	C	O	R	R	R	C	O	C	O	O	O	O	R	R	R	R	R	R	R	O	R	C	6	12	12	2.46	
May,	R	O	C	R	R	R	R	O	C	R	C	O	R	R	R	R	C	C	R	R	O	R	R	R	R	R	R	R	O	R	O	7	17	7	6.61	
June.	O	O	O	O	C	R	C	O	O	R	R	R	R	C	C	R	C	C	C	C	R	R	R	R	R	R	O	R	C	C	C	10	12	8	2.97	
July.	C	R	R	C	R	O	O	O	O	O	C	R	R	R	R	O	R	C	C	C	O	O	C	R	R	R	R	C	R	C	O	O	9	11	11	2.80
August.	R	C	C	O	R	C	C	R	C	R	R	C	C	R	O	C	R	R	R	R	R	R	C	O	C	R	R	C	R	C	O	12	15	4	5.70	
September. . . .	O	C	C	O	R	C	C	R	C	C	R	R	R	R	R	R	R	O	C	R	C	C	C	O	C	R	R	O	C	C	C	13	12	5	2.89	
October.	C	R	R	C	O	R	R	O	O	C	R	R	R	R	O	R	O	O	R	R	R	C	R	R	R	R	R	C	R	C	C	9	16	6	6.40	
November. . . .	O	R	C	S	O	C	C	C	C	C	R	R	C	C	R	R	R	C	R	RS	O	C	O	O	C	C	C	O	C	C	C	14	10	6	1.12	
December. . . .	S	C	RS	C	C	R	S	S	C	S	C	S	O	C	O	S	S	R	O	O	R	O	C	C	C	S	S	C	S	C	RS	11	16	4	2.42	
Total. . . . .	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..	115	173	77	42.57

January 12, temperature 63°.

February 12, first appearance of hard frosts.

February 12, first rain storm, accompanied by thunder and lightning, temperature 63°.

April 9, great darkness spread over the city, 7.45 to 7.55, also 9.45 to 11.15 A. M. April 13, temperature 82°.

C—Cloudy.

R—Rain.

S—Snow.

O—Clear.

TOTAL AMOUNT OF TAXATION ON A \$10, 000 FARM (ACTUAL VALUATION).

(See page 286.)

Northumberland,	\$58 80	York,	\$91 40
Lehigh,	59 30	Adams,	91 60
Northampton,	62 70	Franklin,	91 90
Lancaster,	67 80	Delaware,	93 20
Cumberland,	68 30	Blair,	100 80
Union,	70 50	Lackawanna,	100 80
Centre,	71 80	Lawrence,	110 50
Crawford,	74 30	Juniata,	112 70
Montour,	74 00	Clearfield,	114 00
Beaver,	74 70	Tioga,	118 70
Columbia,	76 90	Fulton,	120 80
Bucks,	78 70	Elk,	134 00
Montgomery,	78 00	Clinton,	128 10
Mercer,	79 80	Indiana,	146 60
Armstrong,	80 00	Forest,	146 40
Berks,	80 80	Fayette,	150 00
Westmoreland,	80 80	Bedford,	151 90
Schuylkill,	81 80	Venango,	172 00
Perry,	84 90	Lycoming,	176 50
Erie,	85 30	Warren,	177 00
Chester,	85 40	Wayne,	190 00
Pike,	90 00	Susquehanna,	191 20
Washington,	90 00	Cameron,	203 20

PRICES OF FARM PRODUCTS AND LIVE STOCK, MAY, 1890.

COUNTIES.	PRICES OF FARM PRODUCTS							PRICES OF LIVE STOCK						
	Wheat, per bushel.	Corn, per bushel.	Rye, per bushel.	Oats, per bushel.	Potatoes, per bushel.	Hay (clover), per ton.	Hay (timothy), per ton.	Butter, per pound.	Ewes (average), per head.	Lambs, per head.	Horses (average).	Mules (average).	Cows (average).	Chickens (dressed), per pound.
Adams.	\$2 86	cts 35	cts 45	cts 25	\$1 00	\$6 00	\$8 50	cts 33	\$3 75	\$2 75	\$95 00	\$120 00	\$220 00	cts 11
Allegheny.	1 08	45	55	36	65	8 00	12 00	25	3 50	2 25	160 00	125 00	32 50	15
Armstrong.	90	50	55	35	75	5 50	7 00	25	3 75	2 75	125 00	100 00	32 50	9
Beaver.	90	55	65	38	70	5 00	7 50	25	4 00	2 75	180 00	125 00	32 50	16
Bedford.	85	40	50	30	75	7 00	8 00	20	3 00	2 00	100 00	100 00	30 00	9
Berks.	90	40	48	32	60	10 00	12 00	20	3 50	2 75	120 00	100 00	32 50	10
Blair.	85	45	53	37	70	8 00	10 00	25	3 75	2 25	120 00	120 00	32 50	10
Bradford.	87	48	61	35	79	8 00	9 50	30	3 50	3 25	115 00	110 00	32 50	11
Bucks.	90	45	60	30	1 00	9 00	10 00	27	4 00	4 50	150 00	160 00	32 50	13
Butler.	1 00	53	45	35	75	7 00	10 00	20	5 00	3 50	150 00	130 00	32 50	13
Cambria.	92	47	48	36	70	7 00	9 50	30	...	...	115 00	110 00	30 00	9
Cameron.	1 00	60	70	40	75	13 00	18 00	20	...	...	100 00	100 00	30 00	14
Carbon.	95	49	60	35	70	9 00	11 00	20	...	...	110 00	110 00	35 00	10
Centre.	85	40	70	37	87	6 00	7 50	20	4 25	3 25	125 00	125 00	35 00	10
Chester.	90	40	58	34	55	8 00	10 00	24	4 00	3 25	140 00	135 00	35 00	16
Clarion.	85	48	60	35	90	5 00	6 50	18	3 00	3 00	130 00	125 00	34 00	8
Clearfield.	90	55	70	49	75	9 00	10 50	26	2 50	2 25	125 00	120 00	33 00	12
Columbia.	85	45	55	35	75	9 00	10 00	29	4 00	3 00	125 00	125 00	30 00	12
Crawford.	95	48	46	32	75	8 00	10 00	22	5 50	4 50	130 00	120 00	28 00	10
Cumberland.	85	40	52	29	60	5 00	6 50	14	3 50	3 25	125 00	120 00	30 00	10
Dauphin.	92	47	57	30	80	7 00	9 75	20	3 87	3 50	150 00	120 00	33 50	11
Delaware.	85	40	45	35	50	11 00	14 50	25	4 50	4 00	140 00	155 00	40 00	17
Elk.	87	55	47	40	90	12 00	14 00	25	3 00	3 00	100 00	100 00	30 00	11
Erie.	90	45	52	31	65	6 00	8 00	15	6 00	4 00	120 00	120 00	33 50	13
Fayette.	90	50	50	30	60	6 00	9 00	22	3 75	3 25	110 00	115 00	33 00	10
Forest.	90	52	50	32	69	5 50	8 75	20	...	...	100 00	100 00	25 00	9
Franklin.	85	35	48	32	70	7 00	8 25	17	4 00	3 00	130 00	120 00	25 00	10
Fulton.	81	50	50	35	75	6 00	8 00	15	3 50	3 00	100 00	90 00	21 50	9
Greene.	90	55	55	30	70	7 00	8 00	14	5 09	3 00	90 00	95 00	25 00	11
Huntingdon.	85	45	52	30	1 00	10 00	12 00	20	3 75	2 75	100 00	100 00	21 75	9
Indiana.	90	50	55	32	75	7 00	9 00	15	3 50	3 00	115 00	100 00	25 00	14
Jefferson.	90	50	70	35	75	8 00	10 00	18	3 00	2 50	90 00	90 00	25 00	9
Juniata.	93	59	58	33	70	7 50	9 75	19	3 00	2 75	115 00	110 00	25 75	11
Lackawanna.	87	47	60	36	85	10 00	14 00	18	...	...	100 00	100 00	30 00	19
Lancaster.	80	43	47	33	80	10 00	12 00	15	4 00	3 25	125 00	125 00	27 50	12
Lawrence.	1 00	50	55	33	80	7 00	11 00	20	5 00	3 00	125 00	110 00	22 00	10
Lebanon.	85	40	47	30	60	9 00	11 00	20	3 87	3 50	120 00	120 00	23 50	11
Lehigh.	94	40	57	38	70	8 50	11 00	21	4 00	3 25	110 00	110 00	25 00	11
Luzerne.	90	50	55	40	75	13 00	16 50	19	6 00	4 00	130 00	120 00	32 50	14
Lycoming.	92	43	55	32	70	10 00	12 00	18	3 75	3 00	130 00	135 00	25 00	11
McKean.	1 00	60	58	40	75	6 00	8 00	18	3 00	3 00	135 00	135 00	25 00	8
Mercer.	1 00	44	50	32	50	5 00	7 00	14	4 00	2 75	140 00	140 00	35 00	12
Mifflin.	80	40	55	25	60	8 00	10 00	25	3 75	2 25	100 00	110 00	25 00	10
Monroe.	92	47	59	30	67	8 00	10 50	30	...	...	110 00	110 00	25 00	10
Montgomery.	92	40	59	33	15	11 00	13 50	30	4 00	3 50	150 00	150 00	40 00	17
Montour.	90	40	60	30	50	8 00	10 00	25	4 00	3 25	125 00	120 00	30 00	10
Northampton.	95	40	50	30	75	10 00	12 50	25	3 75	3 25	125 00	115 00	33 50	14
Northumberland.	90	45	50	30	75	10 00	12 00	25	5 00	3 25	135 00	130 00	30 00	12
Perry.	85	45	50	30	60	10 00	12 00	14	3 00	2 75	95 00	100 00	21 00	10
Philadelphia.	85	45	60	37	70	13 00	16 00	20	...	...	150 00	150 00	30 00	16
Pike.	87	47	60	32	68	8 00	10 00	20	...	...	110 00	110 00	25 00	10
Potter.	92	40	58	30	65	8 00	10 00	18	...	...	105 00	100 00	22 50	9
Schuylkill.	95	45	50	35	90	12 00	14 00	28	6 00	4 00	95 00	90 00	35 00	12
Snyder.	80	40	45	30	75	8 00	10 00	17	4 00	2 75	130 00	125 00	23 00	10
Somerset.	90	50	70	40	60	8 00	9 75	30	4 50	3 50	125 00	120 00	35 00	11
Sullivan.	1 03	60	55	42	90	8 00	12 00	14	4 50	3 00	140 00	140 00	35 00	12
Susquehanna.	87	45	55	35	70	6 00	7 00	18	4 50	3 00	125 00	120 00	35 00	10
Tioga.	1 10	50	60	40	90	8 00	9 50	14	4 00	3 00	120 00	125 00	35 00	12
Union.	93	45	60	35	70	8 00	9 75	16	...	...	110 00	110 00	25 00	11
Venango.	90	40	55	35	70	7 00	10 00	13	5 00	2 75	180 00	180 00	35 00	14
Warren.	95	55	60	40	50	5 00	6 00	15	4 75	3 00	100 00	100 00	30 00	10
Washington.	1 00	50	55	35	90	7 00	9 00	15	5 00	3 75	125 00	120 00	35 00	11
Wayne.	1 00	45	55	40	1 00	6 00	8 00	15	3 90	3 25	125 00	120 00	30 00	10
Westmoreland.	90	47	55	31	50	8 00	10 50	18	4 00	3 00	120 00	125 00	30 00	10
Wyoming.	90	50	55	35	55	6 00	7 50	18	4 00	3 00	95 00	95 00	26 00	12
York.	88	35	45	30	75	11 00	13 00	25	3 50	3 00	140 00	150 00	30 00	12

FARM WAGES AND BOARD—1890.

COUNTIES.	By the month (whole year), with board.	By the month (summer months only), with board.	By the day (transient work), with board.	By the day with regular work (with board).	By the day with regular work (without board).	By the month (whole year), without board.	By the month for summer months (without board).	By day for transient work (without board).	Harvest wages (with board).	Household help, female (with board, by week).	Estimated cost of boarding farm hands per day.
Adams.	\$10 00	\$12 50	\$0 75	\$0 62	\$1 00	\$18 00	\$20 00	\$1 00	\$1 25	\$1 50	\$0 36
Allegheny.	16 00	20 00	1 00	1 00	1 20	24 00	28 00	1 40	1 50	2 50	37
Armstrong.	14 00	18 00	1 00	75	1 00	18 00	22 50	1 20	1 25	2 00	36
Beaver.	16 00	20 00	75	70	1 10	22 50	26 50	1 00	1 25	2 50	45
Bedford.	10 00	12 00	75	60	1 00	16 75	18 75	1 00	1 25	2 50	40
Berks.	12 50	17 00	87	75	1 00	18 50	22 00	1 00	1 15	1 75	39
Blair.	12 50	18 00	87	75	1 10	20 00	24 00	1 10	2 00	2 00	35
Bradford.	12 00	17 50	80	75	1 00	20 00	24 00	1 05	1 50	1 75	35
Bucks.	13 00	16 00	1 00	75	1 25	18 00	24 00	1 20	1 50	2 00	45
Butler.	18 50	22 50	1 00	75	1 15	25 00	28 50	1 15	1 50	2 00	50
Cambria.	13 75	15 50	90	87	1 00	20 00	22 00	1 00	1 37	1 75	40
Cameron.	18 00	24 00	1 25	1 00	1 25	30 00	35 20	1 25	1 50	2 75	40
Carbon.	16 50	18 75	1 00	90	1 00	20 00	24 00	1 15	1 50	2 00	38
Centre.	12 50	14 00	1 12	87	1 15	20 00	24 00	1 15	1 50	2 00	26
Chester.	15 00	18 00	75	75	1 20	23 00	16 00	1 25	1 50	2 00	45
Clarion.	11 00	15 00	75	70	1 00	22 00	25 00	1 00	1 25	1 50	30
Clearfield.	17 50	22 50	1 00	1 00	1 20	18 00	20 00	1 30	1 50	2 00	40
Clinton.	12 50	15 00	90	75	1 10	22 00	25 00	1 00	1 25	1 50	30
Columbia.	12 00	15 00	87	75	1 10	22 00	25 00	1 10	1 50	1 75	36
Crawford.	15 00	20 00	1 00	90	1 15	23 00	26 00	1 15	1 50	2 00	40
Cumberland.	12 00	16 00	75	70	1 00	22 50	24 50	1 10	1 50	1 75	40
Dauphin.	16 00	20 00	87	75	1 00	22 50	24 50	1 00	1 50	2 00	40
Delaware.	17 00	18 50	1 00	80	1 20	30 00	35 00	1 30	1 50	2 25	28
Elk.	13 00	17 50	75	70	1 10	25 00	30 00	1 20	1 25	2 00	45
Erie.	16 00	20 00	1 00	90	1 10	25 00	30 00	1 25	1 75	2 25	38
Fayette.	15 00	20 00	1 15	1 00	1 20	30 00	35 00	1 25	1 50	2 00	40
Forest.	13 50	15 50	1 00	87	1 10	18 00	22 50	1 15	1 50	1 75	38
Franklin.	11 00	13 00	75	60	1 00	18 00	22 50	1 00	1 50	1 50	35
Fulton.	10 00	20 00	50	50	75	18 00	22 50	1 00	1 75	2 00	45
Greene.	15 00	18 00	75	65	1 10	20 00	24 00	1 00	1 25	2 00	40
Huntingdon.	12 00	14 00	1 00	75	1 00	22 50	25 00	1 00	1 50	2 00	30
Indiana.	12 50	16 00	1 00	75	1 00	22 50	25 00	1 20	1 25	2 25	45
Jefferson.	13 00	15 00	75	60	1 00	20 00	24 00	1 15	1 25	1 75	30
Junata.	15 00	18 00	87	75	1 00	20 00	22 50	1 10	1 35	1 75	35
Lackawanna.	18 00	20 00	1 00	90	1 10	20 00	22 50	1 20	2 00	2 00	25
Lancaster.	15 00	18 00	1 00	90	1 15	20 00	25 00	1 25	1 50	2 25	28
Lawrence.	15 00	18 00	1 00	75	1 10	20 00	25 00	1 20	1 35	2 00	26
Lebanon.	11 00	13 50	75	60	1 00	22 75	25 75	1 10	1 25	1 75	45
Lehigh.	17 50	18 75	87	75	1 00	25 00	28 00	1 10	1 50	2 00	40
Luzerne.	16 00	18 00	1 00	75	1 00	24 50	33 00	1 00	1 50	2 00	29
Lycoming.	18 00	20 00	1 00	87	1 00	25 00	27 10	1 20	2 00	2 25	35
McKean.	18 50	20 75	1 00	95	1 15	26 00	30 00	1 30	1 50	2 25	40
Mercer.	15 00	20 00	1 00	75	1 15	19 50	22 50	1 25	1 75	2 00	45
Mifflin.	10 50	13 00	65	55	90	18 00	22 50	1 00	1 25	1 35	45
Monroe.	12 50	14 75	1 00	75	1 00	20 00	24 00	1 10	1 50	1 75	40
Montgomery.	14 50	18 00	1 25	1 15	1 25	30 00	34 50	1 20	1 50	2 50	45
Montour.	12 00	14 00	75	60	90	20 00	22 00	1 00	1 25	2 00	30
Northampton.	12 00	14 00	75	65	1 00	20 00	22 00	1 10	1 50	2 00	30
Northumberland.	15 00	18 00	75	75	1 00	25 00	27 50	1 00	1 50	2 00	35
Perry.	9 50	11 00	65	60	85	18 00	21 50	95	1 25	1 35	28
Philadelphia.	18 00	20 00	1 35	1 20	1 50	20 00	22 00	1 50	2 25	2 50	48
Pike.	16 00	18 50	1 00	87	1 10	20 00	22 00	1 10	1 50	2 00	40
Potter.	15 75	18 75	95	87	1 00	20 00	22 00	1 00	1 75	2 00	40
Schuylkill.	14 00	16 50	1 10	1 00	1 15	20 00	25 00	1 25	1 50	2 00	35
Snyder.	16 00	15 00	75	60	1 00	17 50	21 50	1 00	1 25	1 50	23
Somerset.	15 00	17 00	75	75	1 00	20 00	22 00	1 00	1 35	2 00	37
Sullivan.	20 00	23 50	1 00	90	1 20	24 00	28 00	1 20	2 00	2 25	45
Susquehanna.	12 00	16 00	75	62	80	19 00	21 00	85	1 25	1 50	30
Tioga.	15 00	20 00	1 00	1 00	1 25	20 00	22 00	1 25	1 50	2 00	28
Union.	15 75	17 75	1 00	87	1 10	20 00	22 00	1 15	1 50	1 75	40
Venango.	15 00	18 00	1 00	75	1 15	25 00	30 00	1 20	1 25	2 00	40
Warren.	15 00	17 00	1 00	80	1 05	20 00	24 00	1 20	1 50	2 25	40
Washington.	17 50	20 00	1 00	80	1 10	28 50	32 50	1 25	1 50	2 00	48
Wayne.	17 50	20 00	95	87	1 00	20 00	22 00	1 10	1 50	2 00	30
Westmoreland.	14 00	18 00	1 20	1 00	1 25	28 00	32 50	1 25	1 50	2 00	35
Wyoming.	15 00	17 00	1 00	85	1 10	24 00	26 50	1 10	1 50	2 00	28
York.	12 50	17 50	75	55	75	20 50	22 50	1 00	1 25	1 75	37
Average.	\$14 25	\$17 67	\$0 78	\$0 78	\$1 50	\$22 60	\$26 06	\$1 14	\$1 44	\$1 96	38

LIST OF COUNTY AND LOCAL AGRICULTURAL SOCIETIES,

With Names and Addresses of Secretaries and Dates for holding Fall Exhibitions of 1890, compiled from official reports and sources by the Pennsylvania Board of Agriculture.

[Those marked with an * are represented in the Board of Agriculture by elected members.]

COUNTY.	Corporate Name of Society.	Name and Address of Secretary.	Where held.	When held.
	PENNSYLVANIA STATE AGRICULTURAL SOCIETY, STATE HORTICULTURAL ASSOCIATION, INTERSTATE EXPOSITION, FARMERS' ENCAMPMENT ASSOCIATION,	D. W. Sailer, Harrisburg, . . E. B. Engle, Waynesboro, . . R. H. Thomas, Mechanicsburg, Dr. T. A. Correll, Harrisburg,	York, Holds no fair, Williams' Grove, Mt. Gretna,	October 6-11. Holds no fair. August 25-30. August 18-23.
Armstrong,*	Dayton Agricultural and Mechanical Association,	J. A. Morrow, Dayton,	Dayton,	Sept. 30-Oct. 3.
Do.	Petroleum Agricultural Society,	R. Balf, Parker's Landing,	Parker's Landing, Beaver,	Sept. 15-18. Sept. 23-26.
Beaver,*	Beaver County Agricultural Society,	R. W. Stiffy, Beaver,	Hookstown,	Sept. 19-22.
Do.	Mill Creek Valley Agricultural Society,	R. M. Swaney, McCleary,	Bedford,	Sept. 30-Oct. 3.
Bedford,*	Bedford County Agricultural Society,	T. S. Gilchrist, Bedford,		
Berks,*	Berks County Agricultural and Hort. Society,	Cyrus T. Fox, Reading,	Reading,	Sept. 16-19.
Do.	Keystone Agricultural Society,	C. J. Rhode, Kutztown,	Kutztown,	October 7-10.
Blair,*	Blair County Agricultural Society,	J. M. Lingafelt, Hollidaysburg,	Hollidaysburg,	Sept. 10-13.
Bradford,*	Bradford County Agricultural Society,	J. H. Coddling, Towanda,	East Towanda,	Sept. 23-26.
Do.	Union Agricultural Association,	C. D. Derrah, Canton,	Canton,	Sept. 2-4.
Do.	Troy Farmers' Club,	J. R. Vannoy, East Troy,	Troy,	August 26-29.
Bucks,*	Doylestown Agricultural and Mechanical Institute	J. E. Zorns, Doylestown,	Doylestown,	Sept. 23-26.
Butler,*	Butler County Agricultural Society,	W. P. Roessing, Butler,	Butler,	Sept. 9-12.
Cambria,	Cambria County Agricultural Association,	C. A. Buck, Hastings,	Carrolltown,	Sept. 8-11.
Carbon,	Carbon County Industrial Society,	E. Bauer, East Mauch Chunk,	Lehighton,	October 7-10.
Centre,*	Centre County Agricultural Society,		Bellefonte,	No fair.
Chester,*	Chester County Agricultural Society,	B. Lear, West Chester,	West Chester,	No fair.
Do.	Oxford Agricultural Society,	Branson Slack, Oxford,	Oxford,	Sept. 24-26.
Do.	Phoenixville Agricultural and Driving Park Ass'n	I. J. Tustin, Phoenixville,	Phoenixville,	No report.
Clarion,*	Clarion County Agricultural Society,	J. H. Patrick, Clarion,	Clarion,	Sept. 23-26.
Clearfield,	DuBois Agricultural Society,	E. B. Nettleton, DuBois,	DuBois,	Sept. 2-6.
Clinton,*	Clinton County Agricultural Society,	D. J. McNaui, Cedar Springs,	Cedar Springs,	No fair.
Columbia,*	Columbia County Agricultural Society,	M. P. Lutz, Bloomsburg,	Bloomsburg,	October 15-18.

Do.	Northern Columbia and Southern Luzerne Agricultural Society,	J. H. Eck, Berwick,	Berwick,	Sept. 8-6.
Do.	Benton Agricultural Society,	H. O. McHenry, Benton,	Benton,	October 1-4.
Crawford,*	Crawford County Agricultural Society,	A. J. Harper, Conneautville,	Conneautville,	Sept. 2-5.
Do.	French Creek Valley Agricultural Society,	J. H. Adams, Cochranston,	Cochranston,	Sept. 10-12.
Do.	Oil Creek Valley Agricultural Society,	F. W. Truesdale, Titusville,	Titusville,	Sept. 2-5.
Do.	Woodcock Fair Association,	A. W. Spaulding, Vanango,	Woodcock,	No fair.
Do.	Central Crawford Agricultural Society,	A. F. Moses, Cambridge,	Cambridgeboro',	Sept. 16-19.
Cumberland,*	Cumberland County Agricultural Society,	E. B. Watts, Carlisle,	Carlisle,	Sept. 30-Oct. 3.
Dauphin,*	Dauphin County Agricultural Society,	W. H. H. Seig, Steelton,	No fair.	No fair.
Do.	Graz Agricultural Society,	H. G. Dornhelm, Gratz,	Gratz,	Sept. 23-26.
Delaware,*	Delaware County Agricultural Society,	H. C. Snowden, Media,	Elwyn,	No report.
Elk,	Elk County Agricultural Society,	U. L. Bear, St. Mary's,	St. Mary's,	No report.
Erie,*	Erie County Agricultural Society,	W. H. Luce, Erie,	Erie,	No fair.
Do.	North Western Agricultural Society,	N. Stone, Corry,	Corry,	Sept. 16-19.
Do.	Wattsburg Agricultural Society,	W. H. Cornell, Wattsburg,	Wattsburg,	Sept. 16-19.
Do.	Edinboro' Agricultural Society,	C. O. Scrafford, Edinboro',	Edinboro',	Sept. 9-12.
Fayette,	Fayette County Agricultural Association,	W. C. McKean, Uniontown,	Uniontown,	August 26-29.
Franklin,*	Farmers' Association of Franklin County,	H. Onwake, Greencastle,	Greencastle,	Holds no fair.
Greene,	Greene County Agricultural Society,	J. L. Clawson, Carmichaels,	Carmichaels,	October 8-9.
Do.	Waynesburg Central Agricultural Society,	R. F. Downey, Waynesburg,	Waynesburg,	No fair.
Indiana,*	Indiana County Agricultural Society,	John H. Pierce, Indiana,	Indiana,	Sept. 30-Oct. 3.
Jefferson,*	Jefferson County Agricultural Society,	S. H. Whitehill, Brookville,	Brookville,	Sept. 9-12.
Do.	Punxsutawney Agricultural Society,	T. J. Cooper, Punxsutawney,	Punxsutawney,	Sept. 16-19.
Junata,*	Junata County Agricultural Society,	M. R. Wharton, Port Royal,	Port Royal,	Sept. 30-Oct. 3.
Lackawanna,*	Lackawanna County Agricultural Society,	D. M. Jones, Scranton,	Scranton,	Sept. 22-25.
Do.	North Lackawanna Farmers' Association,	J. L. Stone, Waverly,	Waverly,	Holds no fair.
Lancaster,*	Lancaster County Agricultural Society,	J. C. Linvill, Gap,	Lancaster,	Holds no fair.
Do.	Lancaster County Fair Association,	Jacob B. Long, Lancaster,	Lancaster,	Sept. 9-12.
Lawrence,*	Lawrence County Agricultural Society,	J. B. Johnston, New Castle,	New Castle,	August 26-29.
Lebanon,*	Lebanon Valley Agr. and Mechanical Ass'n,	J. H. Ubrich, Lebanon,	Lebanon,	Sept. 2-5.
Lehigh,*	Lehigh County Agricultural Society,	L. P. Hecker, Allentown,	Allentown,	Sept. 29-Oct. 3.
Luzerne,*	Luzerne County Agricultural Society,	D. O. McCollum, Wyoming,	Wyoming,	Sept. 9-12.
Do.	Dallas Union Agricultural Society,	John T. Phillips, Dallas,	Dallas,	Sept. 2-5.
Lycoming,*	Muncy Valley Farmers' Club Agricultural Society,	A. C. Henry, Hughesville,	Hughesville,	October 15-19.
McKean,	McKean County Agricultural Society,	A. J. Hughes, Port Allegany,	Port Allegany,	No fair.

AGRICULTURAL SOCIETIES—Continued.

COUNTY.	Corporate Name of Society.	Name and Address of Secretary.	Where held.	When held.
Mercer, Do.*	Mercer County Agricultural Society, Mercer County Agricultural Society,	J. P. Hines, Stoneboro', W. J. McKean, Mercer,	Stoneboro', Mercer,	Sept. 24-28 Sept. 8-10.
Do.	Keystone and Buckeye Agricultural Society, Monroe County Agricultural Society,	T. B. Bell, Sharon, R. B. Keller, Stroudsburg,	Sharon, Stroudsburg,	No fair. Sept. 2-8.
Monroe, Montgomery,*	Montgomery, Chester and Berks Agr. Society, Montour County Agricultural Society,	E. P. Ancona, Pottstown, W. B. Baldy, Danville,	Pottstown, Danville,	Sept. 23-28. Sept. 16-19.
Do.	Northern Montour Agricultural Society, Northampton County Agricultural Society,	C. E. Shires, Washingtonville, J. J. Maus, Nazareth,	Washingtonville, Nazareth,	October 7-10. October 7-10.
Do.	Farmers' and Mechanics' Institute, Milton Driving Park and Fair Association,	T. H. Hay, Easton, M. H. Barr, Milton,	Easton, Milton,	No report. Sept. 30-Oct. 3.
Northumberland,* Perry,*	Perry County Agricultural Society, Potter County Agr. and Horticultural Society,	J. B. Eby, Newport, C. L. Peck, Coudersport,	Newport, Coudersport,	Sept. 18-19. No report.
Potter,	Schuylkill County Agricultural Society, Ringtown Agricultural Society,	G. H. Yeager, Orwigsburg, I. Applegate, Shenandoah,	Orwigsburg, Ringtown,	Sept. 30-Oct. 3. Sept. 11-13.
Schuylkill,* Do.	Sullivan County Agricultural Society, Susquehanna County Agricultural Society,	F. Newell, Dushore, D. A. Tilsforth, Montrose,	Ringtown, Forks ville,	October 1-3. October 1-2.
Sullivan,* Susquehanna,* Do.	Susquehanna County Agricultural Society, Harford Agricultural Society,	L. Tufany, Harford, W. T. Estabrook, Great Bend,	Montrose, Harford,	Sept. 24-25. No report.
Do.	Keystone Agricultural Society, Farmers' Agricultural Society of Tioga County, Tioga County Agr. and Mech. Industrial Ass'n,	J. W. Matther, Wellsboro', J. A. Elliott, Mansfield,	Great Bend, Wellsboro',	Sept. 2-5. Sept. 24-26.
Tioga,* Do.	Union County Agricultural Society, Venango County Agricultural Society,	G. E. Long, Lewisburg, J. Miller, Franklin,	Lewisburg, Franklin,	October 7-9. No fair.
Union,* Venango,*	Warren County Agricultural Association, Western Pennsylvania Agricultural Association, Union Agriculture Association,	Willis Cowan, Warren, A. G. Happer, Washington, W. Melvin, Burgettstown,	Warren, Washington, Burgettstown,	Sept. 9-12. Sept. 1-5. Sept. 30-Oct. 2.
Warren,* Washington,* Do.	Wayne County Agricultural Society, Westmoreland County Agricultural Society,	R. M. Stocker, Honesdale, M. N. Clark, Greensburg,	Honesdale, Greensburg,	Sept. 23-25. October 7-10.
Wayne,* Westmoreland,*	Wyoming County Agricultural Society, York County Agricultural Society,	J. W. Platt, Tunkhannock, E. Chapin, York,	Tunkhannock, York,	Sept. 18-20. October 6-11.
Wyoming,* York,* Do.	Hanover Agricultural Society,	M. O. Smith, Hanover,	Hanover,	Sept. 9-12.

OFFICE PENNSYLVANIA STATE BOARD OF AGRICULTURE,

HARRISBURG, PA., January 1, 1891.

The following schedule of valuation has been adopted by the Board of Agriculture for use during the year ending January 1, 1891:

	Cts. per lb.
Nitrogen in ammonia salts,	19
in nitrates,	17
Organic nitrogen in dry and fine ground fish meat and blood,	19
in cotton-seed meal and castor pomace,	15
in fine bone and tankage,	16½
in fine-medium bone and tankage,	13
in medium bone and tankage,	10½
in coarse bone and tankage,	8½
in hair, bone shavings and coarse fish scrap,	8
Phosphoric acid, soluble in water,	8
soluble in ammonium citrate* (reverted),	7½
in dry ground fish, fine bone and tankage,	7
in fine-medium bone and tankage,	6
in medium bone and tankage,	5
in coarse bone and tankage,	4
in fine ground rock phosphate,	2
Potash as high-grade sulphate and in forms free from muriate (ashes),	6
as kainit,	4.5
as muriate,	4.5

Mixed Fertilizers.

In the valuation of all mixed fertilizers it is assumed that the nitrogen is obtained from raw materials of the best quality, and it is therefore credited at nineteen (19) cents per pound.

Insoluble phosphoric acid is valued at three (3) cents, unless found to be from S. C. rock.

Potash is valued as muriate (4½ cents per pound) if enough chlorine is present to combine with it; if not, any excess is valued as sulphate, at (6) six cents per pound.

Ground Bone.

Ground bone is sifted into four grades of the following fineness: Fine, less than $\frac{1}{16}$ inch; fine-medium, less than $\frac{1}{8}$ inch; medium, less than $\frac{1}{4}$ inch and coarse, over $\frac{1}{4}$ inch. Each grade has its own valuation for nitrogen and phosphoric acid, the percentages of which are assumed to be the same for all the grades.

The valuation obtained by the use of the above figures does not include the items of bagging, mixing and handling; to cover these items a universal addition of four dollars per ton is made to *all mixed fertilizers*.

These valuations are intended to form a basis from which "the comparative commercial value" of a fertilizer may be obtained; they do not follow the fluctuations of the market, and not having been changed from those of last year, any analyses made this year may be compared with that of the same brand, made last year.

The "comparative commercial value" is obtained by multiplying the number of pounds of the ingredient in each ton, by the price per pound; the sum total of these amounts forming the comparative commercial value per ton.

THOMAS J. EDGE,
Secretary.

* Neutral solution of 1.09 sp. gr. using 100 c. c. for 30 minutes at 65°C.

AN ACT to Regulate the Manufacture and Sale of Commercial Fertilizers.

SECTION 1. *Be it enacted, &c.* That every package of commercial fertilizers sold, offered or exposed for sale, for manurial purposes, within this commonwealth, shall have plainly stamped thereon the name of the manufacturer, the place of manufacture, the net weight of its contents, and an analysis, stating the percentage therein contained of nitrogen, or its equivalent in ammonia in an available form, of potash soluble in water, of soluble and reverted phosphoric acid, and of insoluble phosphoric acid: *Provided*, That any commercial fertilizer sold, offered or exposed for sale, which shall contain none of the above-named constituents, shall be exempt from the provisions of this act.

SECTION 2. Every manufacturer or importer of commercial fertilizers, as specified in section one of this act, shall, on or before the first day of August next ensuing, or before offering the same for sale in this commonwealth, file, annually, in the office of the Secretary of the Commonwealth an affidavit, stating the amount of said fertilizer or fertilizers sold within the state during the last preceding year, and if said amount be one hundred tons or less, he or they shall pay to the Treasurer of the State the sum of ten dollars for each and every such article of such commercial fertilizer sold within the state during the last preceding year, and if the said amount shall exceed one hundred tons and be less than five hundred tons, he or they shall pay the sum of twenty dollars as aforesaid, and if said amount shall be five hundred tons or more he or they shall pay the sum of thirty dollars as aforesaid; if such manufacturer or manufacturers or importers shall not have made any sales within the commonwealth during the preceding year, he or they shall pay the sum of ten dollars as aforesaid; every such manufacturer or importer, shall at the same time file with the Secretary of the Board of Agriculture a copy of the analysis required by section one of this act, and shall be entitled to receive from the Secretary of the Commonwealth a certificate, which shall be countersigned by the Secretary of the Board of Agriculture, showing that the provisions of this act have been complied with.

SECTION 3. Any person selling, offering or exposing for sale any commercial fertilizer, without the analyses required by section one of this act, or with an analysis stating that it contains a larger percentage of any one or more of the above-named constituents than is contained therein, or for the sale of which all the provisions of section two have not been complied with, shall be deemed guilty of a misdemeanor, and on conviction shall forfeit a sum not less than twenty-five and not exceeding one hundred dollars for the first offense, and not less than two hundred dollars for each subsequent offense, one-half of which shall be for the use of the informer, and the remainder for the county in which the conviction is secured: *Provided*, Said informer be the purchaser and the goods be for his own use.

SECTION 4. It shall be the duty of the Board of Agriculture to analyze such specimens of commercial fertilizers as may be furnished by its agents, said samples to be accompanied with proper proof, under oath or affirmation, that they were fairly drawn; the fee for such analysis shall be determined by the executive committee of the Board, and be based upon a fixed rate for each determination, shall in no case exceed seventy-five per centum of the usual price paid for such services, and shall be payable from the treasury of the commonwealth in the manner as now provided by law.

SECTION 5. The money paid into the treasury under the provisions of this act shall constitute a special fund from which the cost of such analysis shall be paid: *Provided*, That the total amount thus expended in any one year, shall in no case exceed the amount paid into the treasury during the same year, and that any moneys remaining in this special fund at the end of the year shall be passed into the general fund for the use of the state.

SECTION 6. The term "commercial fertilizers," as used in this act, shall be taken to mean any and every substance imported, manufactured, prepared or sold for fertilizing or manuring purposes, except barn-yard manure, marl, lime and wood ashes, and not exempt by the provisions of section one of this act.

SECTION 7. This act shall go into effect on and after the first day of August, one thousand eight hundred and seventy-nine.

APPROVED—The 28th day of June, A. D. 1879.

TABULATED ANALYSES OF COMMERCIAL FERTILIZERS.

From Samples selected in accordance with the provisions of the act of June 23, 1879, by The State Board of Agriculture or its agents. Analyses by DR. WM. FREAR, Chemist of the Board, and of the State Experiment Station, State College P. O., Pa.

COMPLETE FERTILIZERS.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
365	Allegheny City Fertilizer Works, Allegheny, Pa.	Raw Bone Phosphate.	Leeschburg.	Nov. 24, 1890	9.04	2.12	3.99	4.66	1.63	6.44	\$42 10	\$35 00	365
178	Allentown Manufy. Co., Allentown, Pa.	Complete Bone Manure.	Allentown.	Oct. 28, 1890	6.99	2.48	3.22	7.16	4.36	1.68	27 47	33 00	178
179	Allentown Manufy. Co., Allentown, Pa.	Complete Bone Phosphate.	"	"	7.21	5.53	3.29	3.02	1.89	1.46	26 94	36 00	179
180	Allentown Manufy. Co., Allentown, Pa.	Lehigh Phosphate.	"	"	10.69	2.06	4.45	2.77	1.89	1.21	22 08	27 00	180
181	Allentown Manufy. Co., Allentown, Pa.	Sol Phosphate and Potash.	"	Oct. 9, 1890	10 11	6.65	3.34	0.80	2.91	"	22 60	26 00	181
322	J. L. Amway, Chickies, Pa.	Improved Phosphate.	Chickies.	Sept 29, 1890	3.69	"	0.47	0.38	1.93	0.20	8 02	27 00	322
498	"	Improved Phosphate.	"	Oct. 23, 1890	4.24	"	0.59	0.54	1.90	0.56	9 60	27 00	498
323	A. Arner & Son, New Mahoning, Pa.	Hero Phosphate.	Lehighton.	Nov. 4, 1890	12 04	5.15	3.22	2.11	2.97	1.37	25 67	29 00	323
324	"	Jumbo Phosphate.	"	Oct 31, 1890	13.49	5.68	2.68	1.64	2.15	0.84	23 11	24 00	324
325	"	Victor Phosphate.	"	"	9 50	5.02	3.36	3.49	2.88	1.85	28 77	34 00	325

184	Baugh & Sons Co., Philadelphia, Pa., . .	Bone and Potash Comp., . .	Southwark, . . . . .	..	14.05	7.45	1.57	2.55	1.79	1.05	25 64	25 00	184
185	..	Dissolved Animal Bone, . . .	..	..	7.83	1.68	9.53	5.69	...	3.00	35 87	33 00	185
186	..	Double Eagle Phosphate, . . .	Doylstown, . . . . .	..	9.15	6.27	2.31	4.53	0.29	2.38	29 84	25 00	186
188	..	Special Fert. for Tobacco, . . .	Southwark, . . . . .	..	8.93	5.32	3.01	2.60	2.68	4.43	37 88	35 00	188
190	..	\$25 Phosphate,	Dillsburg, . . . . .	..	14.00	6.43	1.84	3.67	0.29	2.24	28 12	25 00	190
389	..	Ammoniated Dissolved Bone, . . .	Gettysburg,	Nov. 21, 1890	11.56	8.49	1.80	2.81	...	1.71	28 44	28 00	389
388	Baltimore Pulverizing Co., Baltimore, Md., .	Farmers' Favorite Fertilizer, . . .	Hanover, . . . . .	..	7.53	0.97	2.95	1.92	2.17	0.98	16 83	19 00	388
328	D. Blocker & Co., Gettysburg, Pa., . . .	High Grade Phosphate, . . .	Ephrata,	Nov. 4, 1890	12.81	8.74	1.82	2.59	1.28	0.98	27 23	28 00	328
391	..	Ammoniated Bone Phos., . . .	Gettysburg,	Nov. 21, 1890	12.01	5.63	1.89	1.46	2.34	0.56	20 68	22 00	391
392	..	Dis. Raw Bone and Potash, . . .	..	Dec. 2, 1890	14.71	9.57	2.33	1.54	1.47	1.54	30 94	32 00	392
394	..	Special Mixture, . . . . .	..	Nov. 24, 1890	12.75	7.10	3.03	0.99	1.80	...	21 96	18 00	394
390	E. K. Bollinger & Co., Seitzland, Pa., . .	Ammoniated Bone Phos., . . .	West York,	Nov. 21, 1890	13.41	6.23	2.29	1.79	1.27	1.46	25 09	26 00	390
194	Bowker Fertilizer Co., Boston, Mass., . .	Ammoniated Dissolved Bone, . . .	Hamburg,	Oct. 9, 1890	17.45	7.23	1.31	4.03	1.06	0.98	24 73	31 00	194
195	..	Hill and Drill Phosphate, . . .	Titusville, . . . . .	..	16.15	8.20	1.05	4.29	2.00	1.07	27 07	36 00	195
196	..	Super Phos. and Potash, . . .	..	..	15.09	8.89	1.69	3.87	1.64	...	23 42	26 00	196
321	..	..	Benton,	Sept. 29, 1890	10.80	7.08	4.71	4.31	1.26	...	25 18	22 00	321
198	..	Sure Crop Bone Phosphate, . . .	Hamburg,	Oct. 23, 1890	15.70	5.96	1.71	3.86	1.09	0.63	21 72	28 00	198
329	Bradley Fertilizer Co., Boston, Mass., . .	Alkaline Bone,	Pottstown,	Sept. 29, 1890	12.24	8.10	3.89	1.00	2.35	...	26 03	30 00	329
330	..	Eagle Amm. Bone Phosphate, . . .	..	..	8.86	6.97	3.28	1.10	1.78	1.39	28 21	33 00	330
331	..	Patent Phosphate, . . . . .	..	Oct. 10, 1890	13.25	7.61	3.57	1.40	1.52	2.09	31 72	35 00	331
201	A. R. Brodbeck, Hanover, Pa.,	Mand S. Amm. Phosphate, . . .	Dillsburg, . . . . .	..	11.90	5.59	3.24	4.97	2.05	0.69	24 94	24 00	201
202	..	York Amm. Bone Phosphate, . . .	..	Oct. 9, 1890	10.23	5.50	2.39	4.13	2.99	1.26	26 25	27 00	202
177	Carib Guano Co., Baltimore, Md., . . .	"S. C. and C." Guano, . . .	Easton,	Sept. 12, 1890	4.19	3.21	1.52	14.53	0.36	0.39	19 25	19 50	177
204	Chappell Fertilizer Co., Baltimore, Md., .	Farmers' Alliance Amm. Phos., . .	Dillsburg,	Oct. 9, 1890	11.09	5.35	1.74	0.98	1.78	1.09	21 59	21 00	204
205	..	Imperial Potash Manure, . . .	..	..	11.34	7.91	3.91	0.33	1.41	...	23 87	18 00	205
400	..	Ammoniated Phosphate, . . .	York,	Nov. 21, 1890	14.01	7.86	2.00	1.94	1.33	1.99	29 65	30 00	400
401	..	Soluble Flour of Bone, . . .	..	..	12.90	7.27	1.63	1.78	1.61	1.57	26 56	27 00	401
207	Chemical Co. of Canton, Baltimore, Md., .	Baker's Special Wheat Com., . .	Dillsburg,	Oct. 9, 1890	16.73	7.31	1.83	2.80	2.06	1.11	26 05	24 00	207
208	..	Baker's Standard Guano, . . .	Oil City, . . . . .	..	14.64	6.80	2.24	3.04	3.38	1.96	30 56	32 00	208

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Moisture.	Soluble phosphorus acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of section per ton.	Sample number.
209	Chemical Co. of Canton, Baltimore, Md.,	Dissolved Ammoniated Bone,	Oil City,	Oct. 9, 1890	9.11	7.52	2.86	2.74	. . .	1.78	\$23 05	\$35 00	209
210	" " "	Resurgam Phosphate,	" " " " " " "	" "	13.86	5.28	3.32	2.86	1.96	1.39	26 22	30 00	210
211	" " "	Soluble Alkaline Bone,	Dillsburg,	" "	14.37	8.01	3.62	2.56	3.78	. . .	26 64	21 00	211
403	Chesapeake Guano Co., Baltimore, Md.,	Symington Bone and Potash,	Salisbury,	Nov. 21, 1890	14.13	8.55	3.75	0.25	1.39	. . .	24 67	21 00	403
386	Cincinnati Deacidifying Co., Cincinnati, O.,	Gilead Phosphate,	Leesburg,	Nov. 18, 1890	10.24	2.04	5.52	10.12	3.53	2.43	34 10	32 00	386
404	" " "	Ohio Valley Phosphate,	Latrebe,	Nov. 21, 1890	17.16	1.17	6.87	5.18	1.96	1.65	26 95	28 00	404
405	" " "	Tobacco and Potato Fert.,	Salisbury,	" "	6.62	4.98	4.12	2.77	4.62	4.13	40 97	35 00	405
387	Cleveland Dryer Co., Cleveland, O., . . .	Buckeye Phosphate,	Transfer,	Nov. 18, 1890	9.13	7.83	4.16	2.98	. . .	1.77	30 49	23 00	387
388	" " "	Forest City Bone Phosphate,	" " " " " " "	" "	9.89	6.97	3.36	3.45	. . .	1.98	19 82	30 00	388
389	" " "	Ohio Seed Maker,	Freeport,	" "	8.45	7.65	3.77	3.36	. . .	1.15	28 25	26 00	389
500	Josiah Cope & Co., Lincoln University, Pa.,	Pure Bone Phosphate,	Oxford,	Oct. 23, 1890	11.96	4.71	3.39	4.07	2.37	1.77	27 82	30 00	500
503	Henry Cope & Co., Lincoln University, Pa.,	Ammoniated Bone Phos.,	" " " " " " "	Dec. 2, 1890	5.80	8.43	2.39	1.28	1.90	1.29	28 54	26 00	503
385	Crocker Fertilizer Co., Buffalo, N. Y., . .	Ammoniated Bone Phos.,	Littitz,	Nov. 4, 1890	9.52	4.45	5.43	4.04	1.06	2.75	33 05	35 00	385
372	" " "	Amm. Wheat and Corn Phos.,	Meadville,	Nov. 21, 1890	12.16	7.00	1.75	3.10	2.02	2.24	30 37	30 00	372
373	" " "	New Rival Amm. Phosphate,	Greenville,	Nov. 18, 1890	11.59	6.03	2.50	3.73	2.14	1.49	27 43	28 00	373
518	Cumberland Co. Fert. Co., Carlisle, Pa.,	Grade No. 1 Phosphate,	Greaseon,	Nov. 4, 1890	10.82	6.90	2.70	2.53	2.50	1.09	27 30	23 00	518
519	Cumberland Co. Fert. Co., Carlisle, Pa.,	Patrons' Delight Phosphate,	" " " " " " "	" "	9.05	4.83	3.92	3.35	3.53	2.77	32 22	30 00	519
409	Wm. Davison & Co., Baltimore, Md., . .	Pen-Mar Bone Phosphate,	Hanover,	Nov. 21, 1890	10.40	5.20	3.04	4.13	2.86	1.15	26 54	26 00	409

10	C. H. Dempwolf & Co., York, Pa.	Dissolved Raw Bone.	York.	..	6.75	4.31	8.84	6.48	..	8.40	40.28	33.00	410
216	Equitable Fertilizer Co., Baltimore, Md.	Rose Bone Phosphate.	Newtown.	Oct.	9.1880	10.34	3.79	6.31	6.57	1.10	0.50	25.04	216
217	" "	Emeralds Natural Guano.	"	"	"	12.51	2.67	5.18	6.35	2.63	1.79	29.08	217
275	Eureka Fertilizer Co., Perryville, Md.	Bone and Potash.	Freeport.	Nov. 21, 1880	12.67	10.15	8.62	2.71	0.39	..	27.08	23.00	275
414	" "	Imperial Bone Phosphate.	Apollo.	Dec. 2, 1880	12.07	4.61	2.73	2.92	1.54	0.87	21.78	25.00	414
416	Kurich & Brooks, York, Pa.	Diamond Bone Phosphate.	York.	Nov. 23, 1880	10.39	7.86	4.24	4.23	0.37	0.47	27.53	20.00	416
563	Samuel Fry, McCall's Ferry, Pa.	Ammoniated Bone Phos.	McCall's Ferry.	"	11.91	9.69	1.05	0.19	2.38	1.53	29.37	25.00	563
219	Great Eastern Fertilizer Co., Rutland, Vt.	Wheat Special Fertilizer.	Hamburg.	"	14.70	1.86	8.79	1.96	1.68	2.06	30.65	30.00	219
231	H. F. Hager, Quakertown, Pa.	Ammoniated Phosphate.	Richland Centre.	Oct.	28, 1880	10.34	5.38	4.20	3.11	4.62	2.91	35.96	231
232	" "	Burkholder & Wilson's Phos.	"	"	"	11.47	5.17	2.84	2.63	1.68	36.87	34.00	232
233	" "	Fanner's Favorite Phosphate.	Quakertown.	"	"	11.43	6.28	2.45	2.85	2.32	1.57	27.43	233
224	D. D. Hess & Son, Reading, Pa.	Ammoniated Bone Phos.	Hamburg.	"	"	14.23	5.87	4.10	0.92	1.60	2.04	29.28	224
225	" "	Keystone Dissolved Bone.	"	"	"	13.70	9.16	4.13	0.80	0.96	1.15	30.68	225
417	J. Horner, Jr. & Co., Baltimore, Md.	Ammoniated Bone Phos.	Gettysburg.	Nov. 24, 1880	12.19	5.40	3.73	2.01	2.14	2.18	29.77	28.00	417
418	" "	Diss. Slaughterhouse Bone	"	Dec. 2, 1880	6.68	7.79	5.30	2.97	..	2.24	34.75	33.00	418
226	Samuel H. Howitz, Philadelphia, Pa.	Ammoniated Bone Phos.	Greenwich Point.	Oct. 31, 1880	13.04	7.33	2.71	1.63	2.20	2.21	31.26	33.00	226
227	" "	Ammoniated Dissolved Bone.	"	"	"	14.30	7.44	2.10	1.38	1.94	1.53	27.56	227
228	" "	Asotized Dissolved Bone.	"	"	"	14.01	5.53	3.08	0.85	1.60	1.26	24.15	228
229	" "	Soluble Bone Phosphate.	"	Nov. 18, 1880	11.75	6.38	2.86	1.13	1.04	..	19.85	18.00	229
420	Hubbard & Co., Baltimore, Md.	Standard Bone Phosphate.	Gettysburg.	Dec. 2, 1880	13.38	7.76	2.26	1.51	1.94	1.68	28.90	30.00	420
231	Jarecki Chemical Co., Erie, Pa.	Lake Erie Fish Guano.	Erie.	Oct. 23, 1880	9.65	6.64	2.23	2.91	0.54	0.77	23.27	24.00	231
232	" "	Superphosphate.	"	"	12.23	4.25	3.90	3.09	0.72	0.90	23.71	21.00	232
561	" "	Superphosphate.	Conneautville.	Nov. 22, 1880	5.96	5.68	2.43	3.91	0.85	1.50	25.86	28.50	561
454	F. M. Johnson, Pittsburgh, Pa.	Honest John Phosphate.	Parnassus.	Oct. 4, 1880	16.40	0.14	1.13	2.77	0.68	0.25	5.41	15.00	454
234	T. S. Kenderline, Newtown, Pa.	Ammoniated Phosphate.	Newtown.	Oct. 31, 1880	12.23	8.43	3.75	1.62	1.94	0.79	28.83	26.00	234
235	" "	Bone Phosphate.	"	"	9.50	6.09	3.15	2.67	5.60	2.66	35.19	32.00	235
236	" "	Dissolved Animal Bone.	"	"	6.05	2.27	5.43	7.20	..	4.13	35.87	31.25	236
238	Lancaster Chemical Co., Lancaster, Pa.	Flag Phosphate.	Reading.	Oct. 24, 1880	8.70	3.04	6.23	4.35	1.60	0.95	26.29	25.00	238
239	" "	Rising Sun Phosphate.	"	"	12.06	2.51	5.80	2.07	2.93	0.89	24.01	30.00	239

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
240	Lancaster Chemical Co., Lancaster, Pa.,	Tobacco and Vegetable Fert.,	Reading,	Oct. 24, 1890	10.80	2.73	4.64	2.80	2.73	0.98	\$23 15	\$34 00	240
559	" " " "	Pure Dissolved Bone,	Coatesville,	Nov. 22, 1890	6.09	8.20	3.78	2.59	"	2.44	33.69	28 00	559
464	Lasaretto Chemical Works, Baltimore, Md.	Crop Grower,	Waynesboro',	Dec. 2, 1890	13.55	8.10	1.61	2.29	1.55	1.82	28 98	23 00	464
241	Lister Chemical Works, Newark, N. J.,	Ammoniated Dissolved Bone,	Newtown,	Oct. 28, 1890	10.83	6.43	2.03	2.88	1.60	1.03	25 06	30 00	241
243	" " " "	Harvest Queen Phosphate,	Kittanning,	"	12.88	9.70	2.41	1.28	1.73	1.88	32 70	28 00	243
243	" " " "	Potato Fertilizer No. 2,	Newtown,	"	15.25	6.25	3.96	2.39	4.39	1.93	32 74	36 00	243
245	" " " "	Success Fertilizer,	Kittanning,	"	11.91	9.13	2.70	1.91	1.63	2.10	33 79	27 00	245
377	" " " "	Lister's Celebrated Gr'd Bone	Freeport,	Nov. 21, 1890	8.00	0.45	4.67	10.12	"	2.59	27 64	30 00	377
489	" " " "	Standard Bone Phosphate, . .	West Chester,	Nov. 18, 1890	12.55	10.04	1.28	2.64	1.99	2.68	35 30	33 00	489
422	John A. Livers, Gettysburg, Pa.,	Gold Dust Phosphate,	Gettysburg,	Nov. 24, 1890	12.35	9.71	2.40	0.83	1.13	1.23	29 42	28 00	422
246	Lorents & Rittler, Baltimore, Md.,	Farmer's Alkaline Phosphate,	Kittanning,	Oct. 23, 1890	14.40	8.84	2.84	2.07	1.96	"	24 27	22 00	246
490	Lord & Polk Chemical Co., Odessa, Del.,	Challenge Bone Phosphate, . .	West Chester,	Nov. 18, 1890	8.85	6.39	3.64	1.76	1.08	1.18	26 65	24 00	490
491	" " " "	Champion Fertilizer,	"	"	8.73	6.59	3.05	2.12	1.55	1.29	26 74	26 00	491
248	Mapes Fertilizer Co., New York, N. Y.,	Dissolved Bone and Potash, . .	Allentown,	Oct. 23, 1890	12.47	5.08	5.87	3.40	2.02	1.33	29 91	31 00	248
251	" " " "	Manure for Heavy Soil,	"	"	10.74	5.86	3.17	3.31	4.76	4.63	43 44	45 00	251
252	" " " "	Manure for Light Soil,	"	"	16.13	6.21	1.92	1.85	6.64	4.29	40 21	45 00	252
255	" " " "	XXV Phosphate,	"	"	30.43	5.51	3.14	3.85	1.12	1.88	27 80	27 00	255
241	Maryland Fertilizing Co., Baltimore, Md.,	Alkaline Bone,	Ephrata,	Nov. 4, 1890	12.63	8.94	3.84	1.10	8.51	"	36 94	28 00	241
485	" " " "	Linden Phosphate,	Shippensburg,	Dec. 2, 1890	11.70	8.99	3.34	1.08	2.07	"	26 55	30 00	485

342	..	..	..	Ammoniated Bone.	Ephrata.	Nov. 4, 1880	14.30	7.44	2.40	1.76	1.78	20.88	33.00	843
425	F. Mehring.	York Road, Md.	..	Dissolved Raw Bone.	Hanover.	Nov. 22, 1880	7.15	9.76	7.00	0.78	..	2.27	39.13	426
426	..	..	..	No. 2 Ammoniated Phos.	..	Dec. 1, 1880	9.62	6.88	3.15	4.08	1.11	1.40	27.71	427
427	..	..	..	No. 2 Phosphate.	..	Nov. 22, 1880	10.06	6.77	3.36	3.78	0.81	1.32	37.96	427
257	Michigan Carbon Works,	Detroit, Mich.	..	Homestead Fertilizer.	Lanesville.	Oct. 23, 1880	11.18	8.08	3.33	1.58	1.98	2.15	31.34	257
429	..	..	..	Jarvis Drill Phosphate.	Greensburg.	Nov. 22, 1880	10.17	9.02	1.75	1.23	..	1.36	26.91	429
258	Milson Fertilizer Co.,	East Buffalo, N. Y.	..	Buffalo Fertilizer.	Greensmount.	Sept. 29, 1880	10.81	5.57	1.14	2.96	1.87	2.18	26.54	258
259	..	..	..	Buffalo Guano.	..	..	9.98	6.29	2.27	2.77	1.87	1.98	27.99	259
260	..	..	..	Potato and Tobacco Phos.	..	..	10.45	6.01	1.84	3.10	3.93	2.24	28.88	260
261	..	..	..	Wheat Phosphate.	..	..	14.00	8.94	1.80	1.85	3.20	1.59	31.09	261
455	H. S. Miller & Co.,	Newark, N. J.	..	Chanticleer Phosphate.	Dieblers.	Oct. 4, 1880	15.11	4.49	2.24	0.93	2.88	0.95	22.24	455
506	..	..	..	Harvest Queen Phosphate.	Oxford.	Dec. 2, 1880	8.28	9.09	1.40	1.13	2.74	1.98	32.25	506
265	W. C. Newport.	Willow Grove, Pa.	..	All Crop Fertilizer.	Abington.	Oct. 31, 1880	11.84	7.55	2.65	2.02	1.99	1.77	29.71	265
268	..	..	..	Rectified Phosphate.	Doylstown.	Oct. 23, 1880	10.40	7.58	2.70	2.12	5.40	3.00	37.73	268
339	N. J. Chemical Co.,	Philadelphia, Pa.	..	Button Bone Fertilizer.	Ephrata.	Nov. 4, 1880	18.60	5.53	3.63	2.13	2.61	1.40	27.23	339
343	..	..	..	W. & C. Phosphate.	..	..	8.38	5.95	2.97	3.43	1.28	2.65	31.32	343
378	N. W. Fertilizing Co.,	Chicago, Ill.	..	Garden City Phosphate.	Butler.	Nov. 21, 1880	12.43	2.42	6.70	6.06	0.92	2.63	32.67	378
379	..	..	..	Prairie Phosphate.	..	..	10.79	4.09	4.92	5.41	..	2.06	28.94	379
430	..	..	..	Horse-Shoe Amm. Dis. Bone.	Gettysburg.	Nov. 22, 1880	9.79	3.10	7.10	5.48	1.34	2.24	32.78	430
344	Patapasco Guano Co.,	Baltimore, Md.	..	Baltimore Soluble Phosphate.	Lebanon.	Nov. 4, 1880	14.33	8.40	3.06	1.37	1.49	..	22.98	344
493	Penninsular Fertilizer Co.,	Smymna, Del.	..	Planet Phosphate.	West Chester.	Nov. 18, 1880	5.80	3.68	4.32	4.73	3.41	1.45	27.79	493
271	Frederick Phillips,	Philadelphia, Pa.	..	Pure Phrine.	Norristown.	Oct. 23, 1880	11.15	7.42	2.31	1.33	2.60	1.81	30.06	271
346	..	..	..	Improved Phosphate.	Tamaqua.	Nov. 4, 1880	11.01	7.69	2.47	1.48	2.57	1.77	30.61	346
347	..	..	..	Guarantee Guano.	..	..	11.74	7.07	2.61	0.87	1.69	0.93	25.34	347
479	W. S. Powell,	Baltimore, Md.	..	Tip Top Bone Fertilizer.	Littiz.	Oct. 10, 1880	14.43	7.42	1.84	2.28	1.09	1.34	28.12	479
507	Pugh & Lyons.	Oxford, Pa.	..	Bone Phosphate.	Oxford.	Dec. 2, 1880	6.18	3.33	1.92	5.27	2.83	3.89	33.32	507
349	Hansburg Fertilizer Co.,	Frederick, Md.	..	Ammoniated Bone.	Littiz.	Nov. 4, 1880	13.15	7.67	2.25	1.84	2.08	0.95	26.19	349
435	..	..	..	Old Virginia Compound.	Hanover.	Nov. 22, 1880	13.60	6.64	2.15	4.20	1.89	1.80	27.04	435
470	..	..	..	Excelior Plant Food.	Shippensburg.	Dec. 2, 1880	9.35	8.53	2.06	2.70	1.19	2.16	31.63	470

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where selected.	Date of analysis.	Moisture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of section per ton.	Sample number.
272	Raisin Fertilizer Co., Baltimore, Md.,	Empire Guano,	Dillaburg,	Oct. 23, 1890	13.45	7.53	1.85	1.93	1.86	1.93	\$29 11	\$25 00	272
273	" " " "	Dissolved Bone,	" " " "	" " " "	16.81	7.56	2.69	2.41	" " " "	1.65	27 84	25 00	273
275	Reading Fertilizer Co., Reading, Pa.,	"AA" Phosphate,	Reading,	Sept. 25, 1890	4.28	" " "	4.31	4.49	2.25	1.65	22 12	25 00	275
276	" " " "	"AAA" Phosphate,	" " " "	" " " "	3.36	" " "	2.06	4.52	1.72	1.49	17 52	23 00	276
333	J. S. Reese & Co., Baltimore, Md.,	Bay State Fertilizer,	Lehighton,	Nov. 4, 1890	10.45	6.28	4.73	4.03	2.53	2.24	34 52	40 00	333
334	" " " "	King Philip Alkaline Guano,	" " " "	" " " "	15.74	6.05	2.40	3.63	3.03	1.71	28 75	30 00	334
350	Scott Fertilizer Co., Elkton, Md.,	Sure Growth Phosphate,	Littiz,	" " " "	14.70	8.79	2.55	1.16	2.13	1.61	30 63	31 00	350
509	" " " "	Pure Dissolved Bone,	Chadd's Ford June,	Dec. 2, 1890	6.98	11.55	2.02	3.14	" " " "	2.19	35 73	34 00	509
510	" " " "	Standard Phosphate,	" " " "	" " " "	9.77	8.38	1.92	0.90	2.44	1.45	28 67	28 00	510
511	" " " "	Sure Growth Phosphate,	Oxford,	" " " "	11.54	9.41	2.23	0.98	2.20	1.78	31 84	29 00	511
279	Schaal Brothers, Erie, Pa.,	Erie City Fertilizer,	Erie,	Oct. 23, 1890	13.41	3.60	4.27	3.02	2.45	1.31	25 09	26 00	279
281	Sharpless & Carpenter, Philadelphia, Pa.,	No. 1 Bone Fertilizer,	Southwark,	Oct. 31, 1890	10.49	4.43	3.66	4.51	2.10	1.33	26 32	25 00	281
282	" " " "	Pure Dissolved Bone,	" " " "	" " " "	11.90	7.53	2.98	3.80	" " " "	2.25	26 65	26 00	282
283	" " " "	Soluble Tampico Guano,	" " " "	" " " "	11.44	7.77	2.13	2.04	4.13	2.66	34 67	28 00	283
285	M. L. Shoemaker Co., Philadelphia, Pa.,	Echo Phosphate,	Quakertown,	Oct. 24, 1890	16.10	5.64	3.13	3.13	1.75	1.09	25 45	25 00	285
287	" " " "	Good Enough Phosphate,	Hamburg,	" " " "	11.86	7.54	3.03	2.83	2.31	2.13	32 43	29 00	287
288	" " " "	Swift-Sure Phosphate,	Doylentown,	" " " "	13.66	7.08	2.45	5.19	4.69	2.80	26 95	26 00	288
494	" " " "	283 Phosphate,	West Chester	Nov. 13, 1890	8.26	5.71	3.92	3.84	1.99	1.49	37 25	28 00	494

COMPLETE FERTILIZERS—Continued.

Sample number.	Name and Address of Manufacturer.	Name of Fertilizer.	Where Selected.	Date of analysis.	Mixture.	Soluble phosphoric acid.	Reverted phosphoric acid.	Insoluble phosphoric acid.	Potash.	Nitrogen.	Comparative commercial value per ton.	Selling price at point of selection per ton.	Sample number.
360	Walton & Whann Co., Wilmington, Del.,	Plow Raw Bone Phosphate.	Wetsport,	Nov. 18, 1890	14.48	6.83	3.29	1.59	2.30	2.33	\$32 07	\$35 00	360
361	" " " " " "	Reliance Amm. Phosphate.	" " " " " "	" " " " " "	13.81	3.93	5.95	2.53	1.73	1.49	28 09	30 00	361
444	Joshua Walker, Baltimore, Md.,	Economical Amm. Bone.	Hanover,	Nov. 24, 1890	10.19	6.15	3.56	3.41	1.36	1.37	27 47	22 00	444
445	" " " " " "	Old Pittsburgh Phosphate.	" " " " " "	" " " " " "	10.46	8.31	1.87	1.84	1.74	2.05	30 54	26 00	445
307	F. K. Walt, Pennsylvania, Pa.	Complete Amm. Bone Phos.,	West Point,	Oct. 31, 1890	9.20	4.81	2.53	3.71	1.61	1.37	24 37	34 00	307
308	" " " " " "	Complete Potato Phosphate.	" " " " " "	Nov. 4, 1890	8.91	3.17	1.90	2.15	5.57	2.26	26 73	40 00	308
312	Wando Phosphate Co., Charleston, S. C.,	Wando Blood Phosphate.	Lansdale,	Oct. 31, 1890	9.65	8.33	1.92	2.92	1.77	2.06	31 84	30 00	312
314	Williams & Clark Co., New York, N. Y.,	Royal Bone Phosphate.	Titusville,	Dec. 2, 1890	9.39	5.79	2.03	0.50	3.36	1.81	27 40	28 00	314
364	" " " " " "	Prolific Crop Producer.	Manheim,	Nov. 21, 1890	13.41	4.92	3.35	1.23	1.15	1.21	23 25	24 00	364
560	Windle, Deane & Co., Coatesville, Pa., . . .	Dissolved Animal Bone.	Coatesville,	Nov. 12, 1890	3.95	2.24	9.77	4.06	. . .	2.66	34 73	37 00	560
453	R. A. Woolridge & Co., Baltimore, Md., . .	Kangaroo Complete Komp'nd	Wrightsville,	Nov. 24, 1890	10.47	0.87	5.07	6.93	3.90	1.26	26 28	25 00	453
316	Zell Guano Co., Baltimore, Md.,	Electric Phosphate.	Dillsburg,	Oct. 24, 1890	14.40	10.20	2.33	0.49	2.53	. . .	26 24	24 00	316

330	Walton & Watson Co., Wilmington, Del.,	Benton,	Sept. 25, '90	13.02	7.82	4.06	8.11	19.80	17.00	320
446	Joshua Walker, Baltimore, Md.,	Illoover,	Nov. 24, '90	13.00	11.49	8.24	0.26	21.88	16.00	446
863	Williams & Clark Fert. Co., New York, N. Y.,	Manheim,	Nov. 18, '90	12.75	8.27	3.83	1.87	19.72	18.50	868
315	Zell Guano Co., Baltimore, Md.,	Dillsburg,	Oct. 24, '90	15.40	11.55	2.15	0.41	21.87	18.00	315
		Dias. S. C. Phosphate,								
		Acorn Acid Phosphate,								
		Dias. Bone Phosphate,								

432	N. W. Fertilizing Co., Chicago, Ill.,	Fine Raw Bone,	Gettysburg,	Nov. 23, '90	7.35	24.27	3.80	40 66	33 00	433
433	"	Ground Bone,	"	"	3.67	31.47	2.06	46 61	32 00	433
508	Fugh & Lyons, Oxford, Pa.,	Ground Raw Bone,	Oxford,	Dec. 2, '90	6.68	23.60	4.01	35 33	32 00	508
280	Schaal Brothers, Erie, Pa.	Ground Bone,	Erie,	"	9.25	21.58	3.61	34 33	32 00	280
384	Sharpless & Carpenter, Philadelphia, Pa.,	Ground Bone,	Kennett,	Sept. 30, '90	7 04	23.12	3.61	40 14	34 00	384
289	M. L. Shoemaker Co., Philadelphia, Pa.,	Swift-Sure Ground Bone,	Norristown,	"	6.14	20.78	4.94	39 53	34 00	289
380	Thompson & Edwards Co., Chicago, Ill.,	Pig Foot Ground Bone,	Greenville,	Nov. 21, '90	8.35	16.31	2.86	29 17	31 00	380
382	"	Fine Ground Bone,	"	"	6.56	25.86	2.97	40 98	32 00	382
304	Tygart-Allen Co., Philadelphia, Pa.,	Star Ground Bone,	Greenwich Point,	Oct. 51, '90	5.86	30.99	3.08	33 49	32 00	304
306	Emil Wahl, Philadelphia, Pa.,	Button Bone Meal,	Norristown,	Nov. 24, '90	8.81	26.89	3.42	41 27	34 00	306
452	Walker, Stratman & Co., Pittsburgh, Pa.,	Raw Bone Meal,	Pittsburgh,	"	5.69	25.80	3.69	42 04	35 00	452



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Parsons, Leroy, Harrisburg.
 Parsons, H. C., Williamsport.
 Parsons, George W., Harrisburg.
 Parke, John E., Pittsburgh.
 Parker, Samuel J., Williamsport.
 Patterson, Robert H., Pittsburgh.
 Patterson, Lebanon Church, Allegheny county.

Patterson, John, Glenmore.
 Pemberton, Clifford, Pittsburgh.
 Pennock, Samuel, Kennett Square.
 Pennock, Joseph, Harrisburg.
 Perkins, H. J., Williamsport.
 Perkins, James E., Lemar.
 Perrott, W. S., Philadelphia.
 Peters, C. P., Concordville.
 Peyson, August, Philadelphia.
 Phelps, W. H., Pittsburgh.
 Phillips, John, Pittsburgh.
 Pollock, Samuel, Williamsport.
 Polin, Albert, Wyoming.
 Pomroy, John L., Philadelphia.
 Post, G. S., Williamsport.
 Porter, John F., Newberry.
 Postlethwaite, E. T., Philadelphia.
 Potts, E. Channing, Norristown.
 Pownell, Ambrose, Philadelphia.
 Pratt, Thomas, Philadelphia.
 Presbury, George G., Jr., Philadelphia.
 Pritchett, Borrodale, Frazier.
 Pugh, Chas. E., Philadelphia.
 Purcell, Sylvester, Bloomsburg.
 Pyle, R. C., Easton.

Rank, L. D., Williamsport.
 Raymond, James, Harrisburg.
 Reed, Alexander, Lock Haven.
 Reed, E. W., Erie.
 Reeder, Mrs. A. H., Easton.
 Reigel, James, Easton.
 Reighard, James, Newberry.
 Reighard, Daniel, Newberry.
 Reilly, John A., Harrisburg.
 Reel, Augustus, Harrisburg.
 Reel, John, Harrisburg.
 Reminger, W. H., Williamsport.
 Rhey, George, Millwood.
 Rhodes, William A., Philadelphia.
 Richards, Henry, Easton.
 Richmond, William H., Carbondale.
 Risler, J. D., Philadelphia.
 Road, Jacob, Pittsburgh.
 Roberts, Algernon S., Philadelphia.
 Roberts, George B., Philadelphia.
 Robinson, T. F., Philadelphia.
 Rodgers, Fairman, Philadelphia.
 Rodenbaugh, James S., Easton.
 Rogers, C. B., Philadelphia.
 Rogers, C. R., Philadelphia.
 Rogers, Lucius, Smethport.
 Rogers, Felix, Pittsburgh.
 Rood, D. N., Williamsport.
 Ross, William S., Wilkes-Barre.
 Roth, Jeremiah, Allentown.
 Rouse, William A., Harrisburg.
 Rowley, Thomas A., Pittsburgh.
 Rudy, Joseph, Harrisburg.
 Rudman, William C., Philadelphia.
 Ruggles, A. C., Williamsport.
 Runk, William M., Philadelphia.
 Rupp, H. S., Shiremanstown.
 Rutter, Nathaniel, Wilkes-Barre.
 Rutherford, Abner, Harrisburg.

Rutherford, John B., Harrisburg.
 Rutherford, W. F., Harrisburg.
 Rutherford, William S., Harrisburg.
 Rutherford, F. W., Harrisburg.
 Rutherford, J. F., Harrisburg.
 Rutherford, Silas B., Harrisburg.
 Rutherford, J. Q. A., Harrisburg.
 Rutherford, S. Parke, Cochranville, Chester county.

Saxton, J. O., Mechanicsburg.
 Savery, Peleg B., Philadelphia.
 Schall, David, Norristown.
 Schreiber, O. L., Laubach.
 Schreiner, J. W., Lewisburg.
 Schasley, J. B., Wyoming.
 Scull, Gideon, Philadelphia.
 Scott, John, Pittsburgh.
 Scott, W. H., Philadelphia.
 Seitz, George, Easton.
 Seitz, Frederick, Easton.
 Seiler, Daniel W., Harrisburg.
 Seltzer, George L., Myerstown.
 Serch, David, Easton.
 Shaffer, William S., Harrisburg.
 Shaner, Jefferson, West Chester.
 Sharp, James W., Philadelphia.
 Sharp, John Jr., Wyoming.
 Sharpless, S. J., Street Road, Chester county.
 Shaw, Hugh, Jersey Shore.
 Sheffler, A. G., Williamsport.
 Sheets, J. H. Van, Orwigsburg.
 Sheesley, W. F., Harrisburg.
 Shoemaker, B. A., Philadelphia.
 Shoemaker, William M., Wyoming.
 Shoemaker, William S., Wyoming.
 Shoemaker, Elijah, Kingston.
 Shoemaker, John J., Harrisburg.
 Showers, Jesse, Rausch Gap.
 Shyrook, W. Knight, Philadelphia.
 Sigman, James, Easton.
 Silkman, W. M., Scranton.
 Silverthorn, M. H., Fairview, Erie county.
 Simon, John B., Harrisburg.
 Singer Manufacturing Company, Philadelphia.
 Singerly, W. M., Philadelphia.
 Slade, Alfred, Philadelphia.
 Small, Henry, York.
 Smith, George Handy, Philadelphia.
 Smith, Daniel, Jr., Philadelphia.
 Smith, Philip L., Philadelphia.
 Smith, William B., Philadelphia.
 Smith, Mahlon K., Philadelphia.
 Smith, H. K., Philadelphia.
 Smith, J. B., Dunmore.
 Smith, Henry B., Williamsport.
 Smith, Thomas, Williamsport.
 Smith, Daniel W., Williamsport.
 Smith, J. B., Plymouth.
 Smith, James W., Newberry.
 Smith, J. D. L., Mill Hall.
 Smith, George, New York city.
 Smith, Jacob, Harrisburg.
 Snow, Edward K., Philadelphia.
 Snyder, Daniel W., Easton.
 Sower, F. D., Norristown.
 Spencer, S. S., Lancaster.
 Speer, William W., Pittsburgh.
 Stambaugh, S. C., Lancaster.
 Starr, Isaac, Philadelphia.
 Stearns, L. L., Williamsport.

Steel, John M., Greensburg.
 Steel, William, Greensburg.
 Stephens, Z., Scranton.
 Stewart, Robert, Lima.
 Stokes, T. P. C., Philadelphia.
 Strouble, Jacob, Zion, Centre county.
 Stuart, George H., Philadelphia.
 Sturdevant, E. J., Wyoming.
 Sturdevant, E. W., Wilkes-Barre.
 Swan, Rufus C., Williamsport.
 Swift, Joseph, Philadelphia.

Tasker, Thomas T., Philadelphia.
 Tatham, H. B., Philadelphia.
 Tatham, George N., Philadelphia.
 Taylor, Benjamin H., Williamsport.
 Taylor, Horace E., Williamsport.
 Taylor, William, Womelsdorf.
 Taylor, B. Frank, Womelsdorf.
 Taylor, George R., Womelsdorf.
 Templin, James R., Easton.
 Templin, Wm., Harrisburg.
 Thatcher, Richard, Marsh, Chester co.
 Thayer, Russell A., Allentown.
 Thompson, John I., Half Moon, Centre co.
 Thompson, N. B., Philadelphia.
 Thompson, James, Cogan Station.
 Thompson, Frank, Philadelphia.
 Thomas, Richard, Whitford, Chester co.
 Tinsmann, Garrett, Williamsport.
 Towers, William H., Philadelphia.
 Touzand, Monsieur J., Chateau Ray.
 Tripp, Ira, Scranton.
 Trump, Edward D., Jersey Shore.
 Twaddell, L. H., Philadelphia.
 Tyson, Carroll S., Norristown.

Updegraff, A., Wilkes-Barre.
 Updegraff, Thomas, Newberry.
 Updegraff, Daniel, Newberry.
 Updegraff, Derrick, Newberry.
 Urgnehart, John, Wilkes-Barre.
 Unger, John G., Harrisburg.

Van Buskirk S., Williamsport.
 Vandyke, James, Northumberland.
 Van Leer, Isaac, Wallace, Chester co.
 Vanscoy, Daniel, Wyoming.
 Vanvoorhis, H. B., Pittsburgh.
 Vanvorce, John, Williamsport.
 Vollmer, Charles F., Philadelphia.
 Vonger, James C., Philadelphia.

Wagner, Lotis, Philadelphia.
 Waggoner, John A., Harrisburg.
 Wait, B., Williamsport.
 Walker, George, Montrose.
 Walker, R. J. C., Williamsport.

Walters, Townsend, West Chester.
 Walter, D. J., Bloomsburg.
 Wallace, W. W., Pittsburgh.
 Wallower, John, Harrisburg.
 Wanamaker, William H., Philadelphia.
 Washington, W. P., Shamokin.
 Waterman, Joseph, Philadelphia.
 Waterman, Albert G., Philadelphia.
 Watts, Frederick, Carlisle.
 Watson, Joanna, Philadelphia.
 Watson, Oliver, Williamsport.
 Watson, H. W., Williamsport.
 Weaver, H. A., Philadelphia.
 Weaver, M. B., Williamsport.
 Weikheiser, Enos, Easton.
 Welsh, John, Philadelphia.
 Welsh, Samuel, Philadelphia.
 Welsh, J. Lowber, Philadelphia.
 Welch, Benjamin G., Hughesville.
 Wescott, Thomas S., Ashland.
 Wetz, Thomas H., Norristown.
 Whitman, Thomas J., Philadelphia.
 Whitman, Horace F., Philadelphia.
 White, John, Williamsport.
 Why, John, Jr., Pittsburgh.
 Wible, William, Gettysburg.
 Williams, Sites, Wilkes-Barre.
 Williams, E. C., Harrisburg.
 Wilhelm, J. Schall, York.
 Wilson, D. Y., Green Tree, Chester co.
 Wilson, S. L., Philadelphia.
 Wingard, Samuel C., Williamsport.
 Wolf, William, Harrisburg.
 Wolf, Peter, Williamsport.
 Wolfinger, Levi, Harrisburg.
 Wood, James, Williamsport.
 Wood, Robert, Philadelphia.
 Wood, Thomas, Penningtonville.
 Woodhaus, Samuel, Plymouth.
 Woodward, John V., Williamsport.
 Wright, Joshua, Washington co.

Yeager, Joseph, Philadelphia.
 Yeaton, William H., Philadelphia.
 Young, Alexander, Philadelphia.
 Young, William, Easton.
 Young, James, Middletown.
 Young, Hiram, York.
 Young, John, Jr., Ewing Mills, Allegheny county.
 Young, A. P., Millville, Columbia co.
 Youngman, George W., Williamsport.

Zerbe, Cyrus, Harrisburg.
 Zeigler, John H., Harrisburg.
 Zimmerman, A. M., Harrisburg.
 Zimmerman, F., Williamsport.

ACT OF INCORPORATION AND BY-LAWS. OF THE Pennsylvania State Agricultural Society.

AN ACT

To incorporate the Pennsylvania State Agricultural Society.

Incorporators.	<p>SECTION 1. <i>Be it enacted by the Senate and House of Representatives of the Commonwealth of Pennsylvania in General Assembly met, and it is hereby enacted by the authority of the same, That George W. Woodward, James Irvin, E. A. Thompson, Frederick Watts, T. J. Bingham and others, who have subscribed the constitution lately adopted by a convention assembled at Harrisburg, to improve the condition of agriculture, horticulture and the household arts, be and they are hereby created a body politic and corporate in law, by the name of "The Pennsylvania State Agricultural Society," and by that name shall have perpetual succession, and have capacity to sue and to be sued, and may have a common seal, which at their pleasure may alter or renew; they may take by gift grant, devise, bequest or otherwise, lands and tenements, goods and chattels, necessary for all the purposes for which the society was instituted: <i>Provided</i>, The annual income therefrom shall not exceed ten thousand dollars, independent of annual contributions by members, and the same to convey, lay out, apply and dispose of, for the benefit of the said society, as they under their charter and by-laws may direct.</i></p>
Title.	
Corporate powers.	
Annual income.	
Disposal of same.	
By-laws.	<p>SECTION 2. That the members of the said corporation shall have power to make and enforce such constitution and by-laws as may be necessary for the good government of the society, and the same from time to time to revoke, alter and amend, as they may think proper. <i>Provided</i>, That the same shall not be inconsistent with the constitution and laws of this state.</p>
State appropriation	<p>SECTION 3. That the sum of two thousand dollars, out of any money in the treasury not otherwise appropriated, be and the same is hereby appropriated to the said society; and annually hereafter a sum of equal amount to that paid by the members thereof into its treasury, affidavit of which fact, and the amount so raised by the treasurer of the society, being first filed with the State Treasurer: <i>Provided</i>, Such sum shall not exceed two thousand dollars in any one year.</p>

SECTION 4. That when any number of individuals shall organize themselves into an agricultural or horticultural society, or any agricultural or horticultural society now organized within any of the counties of this commonwealth shall have adopted a constitution and by-laws for their government, elected their officers, and raised annually, by the voluntary contribution of its members any sum of money, which shall have been actually paid into their treasury, for the purpose of being disbursed for the promotion of agricultural knowledge and improvement, and that fact be attested by the affidavit of their president and treasurer, filed with the commissioners of the county, the said county society shall be entitled to receive annually a like sum from the treasurer of their said county: *Provided*, That said annual payment out of the county funds shall not exceed one hundred dollars: *Provided further*, That but one such society in any county shall be entitled to receive such appropriation in any one year, under this act.

County agricultural societies.

County appropriation.

Limitations.

SECTION 5. That the president of the Pennsylvania State Agricultural Society, who shall receive or expend any of the moneys hereby appropriated, shall, annually, on the first Monday of January, transmit to the Governor of the commonwealth a detailed account of the expenditures of all the moneys which shall come into his hands under this act, and stating to whom and for what purpose paid; and a copy of the said report shall be transmitted to the legislature at as early a day as practicable, and the original shall be filed in the office of the Secretary of the Commonwealth. And the presidents of the several county agricultural societies shall annually transmit, in the month of December, to the executive committee of the Pennsylvania State Agricultural Society, all such reports or returns as they are required to demand and receive from applicants for premiums, together with an abstract of their proceedings during the year. This act shall at all times be, within the power of the legislature to modify, alter or repeal the same.

Duty of president.

Duty of presidents of county agricultural societies.

JOHN CESSNA,

Speaker of the House of Representatives.

BENJAMIN MATTHIAS,

Speaker of the Senate.

APPROVED—The twenty-ninth day of March, Anno Domino one thousand eight hundred and fifty-one.

WM. F. JOHNSTON.

CONSTITUTION AND BY-LAWS.

OF THE

Pennsylvania State Agricultural Society.

Title.
Objects.

The name of the society shall be the PENNSYLVANIA STATE AGRICULTURAL SOCIETY. The objects of this society are to foster and improve agriculture, horticulture, and the domestic and household arts.

WHO ARE MEMBERS.

Members.

SECTION 1. The society shall consist of all such persons as shall pay to the treasurer not less than two dollars, and annually, thereafter, not less than two dollars; and also, of honorary and corresponding members, the names of the members to be recorded by the secretary.

The officers of the county agricultural societies in this state, or delegations therefrom, shall be members *ex officio* of this society.

Life members.

The payment of fifty dollars shall constitute life membership, and exempt the members so contributing from all annual payments.

OFFICERS.

Officers.

SECTION 2. The officers of this society shall be a president, vice president from each congressional district, three-fourths of whom shall be practical agriculturists or horticulturists, a treasurer, a corresponding secretary, a recording secretary, a librarian, an agricultural chemist and geologist, and such assistants as the society may find essential to the transaction of its business; an executive committee, consisting of the above-named officers, five additional members, with the ex-presidents of the society, all of whom shall be elected at the annual meeting in January by the qualified members of the society.

When elected.

OF THE PRESIDENT.

President's duties.

SECTION 3. The president shall have a general superintendence of all the affairs of the society.

FIRST VICE PRESIDENT.

Election of and duties of first vice president.

That at the annual election of this society there shall be elected from one of the number of vice presidents one of said officers to act as first vice president, whose duty it shall be to act as president in case of absence or the death of the president.

EX-PRESIDENTS.

That whenever the number of ex-presidents exceeds five (5), the name receiving the lowest number of votes shall be the one dropped from the list of officers. Ex-presidents

OF THE VICE PRESIDENTS.

It shall be the duty of the vice presidents to take charge of the affairs of the association in their several districts; to advance all its objects; to call upon farmers to report as to the condition of agriculture in their neighborhood; to ask for information as to the modes of cultivation adopted by different farmers; and, as far as in their power, to make known the resources of their districts, the nature of its soil, its geological character, and all such matter as may interest farmers in every part of the state. Duties of presidents

Duties of treasurer

TREASURER.

The treasurer shall keep an account of all moneys paid into his hand, and shall pay bills when audited and approved by the executive committee. Each order for payment must be signed by the president or chairman of the executive committee.

CORRESPONDING SECRETARY.

The duty of this officer shall be to invite a correspondence with all persons interested in agriculture, whether in the State of Pennsylvania or elsewhere, but especially with our consuls in foreign countries, that new seeds, vegetables, or live stock may be introduced, and their fitness for cultivation and propagation in our climate be tested. At each stated meeting of the society, he shall read his correspondence, which shall, either the whole, or such parts as may be selected by the society, form a portion of the transactions. He shall also correspond with the president or other officers of each state society in the United States, at least twice in the year, for the purposes of combined and mutual action, and to be informed of the results and progress of each other's efforts; also, to invite mechanics to forward models or implements for examination or trial. Duties of corresponding secretary.

RECORDING SECRETARY.

The recording secretary shall keep the minutes of the society and of the executive committee. At the close of each year he shall prepare for publication such parts of the minutes and transactions of the society as may be designated. Duties of recording secretary.

The recording secretary shall have power to approve of such bills and contracts as he is authorized to make and the treasurer shall pay the same. Powers of recording secretary.

LIBRARIAN.

The librarian shall take charge of all books, pamphlets, etc., belonging to the society, and shall act as curator to Duties of librarian

preserve seeds, implements, or whatever property the society may possess.

Vacancies—how filled.

In case of the death of any of the officers of this society the president shall have power to fill the vacancy by appointment until the next annual meeting of the society.

EXECUTIVE COMMITTEE AND QUORUM.

Duties of executive committee.

The executive committee shall transact the business of the society generally; shall superintend and direct the publication of such of the reports and transactions as they may deem proper, and shall designate the time and places for annual exhibitions, regulate the expenditures, examine all accounts, and keep such general charge of the affairs of the society as may best promote its interests.

Quorum of executive committee.

They shall select their own chairman, and meet quarterly, and at any other time when convened by the president; five members shall form a quorum.

Special meeting of society.

They shall call special meetings of the society when necessary.

ANNUAL MEETING OF THE SOCIETY AND QUORUM.

Annual meeting of society—when held

Mode of electing officers

General and special meetings

Quorum of society.

SECTION 4. The society shall meet annually, on the third Wednesday of January, at Harrisburg, when all the officers of the society, not otherwise appointed, shall be elected by ballot for the ensuing year, and until another election. The polls shall be opened at 10 A. M., and closed at 12 o'clock M., when the result of the election shall be announced. They shall also hold a general meeting at the time of the annual exhibitions, and special meetings whenever convoked by the executive committee.

Fifteen members shall form a quorum for the transaction of business, but no member in arrears shall be entitled to the privileges of the society.

QUALIFICATIONS OF VOTERS.

Qualifications of voters.

SECTION 5. No annual member hereafter shall be entitled to vote for the election of officers of the Pennsylvania State Agricultural Society unless he shall have been a member of the previous state fair, and in default of a state fair, then three months' previous membership shall be necessary.

Eligibility.

SECTION 6. No one shall be eligible to office hereafter who has not obtained a right to vote under section five.

ALTERATIONS.

Alterations and amendments. Vote necessary to.

Must be submitted to executive committee.

SECTION 7. This constitution may be altered or amended at the annual meetings in January, by a vote of two-thirds of the members in attendance.

All amendments to the constitution, to be voted upon at the annual meeting of the society in January, must be submitted to the meeting of the executive committee in September preceding said annual meeting.

HARRISBURG, PA., *January 14, 1890.*

The committee was called to order at 7.30 p. m. by President McDowell.

Members present: Messrs. Zeigler, Taylor, Wilhelm, Nissley, Rutherford, Young, Demming and Seiler.

The minutes of the annual meeting were read and adopted, on motion of Mr. Wilhelm, seconded by Mr. Nissley.

The secretary stated that the minutes could not be given in a verbatim form on account of the sickness of the stenographer at the time they were called for.

Secretary Seiler read letters, regretting their inability to be present, from Messrs. Holstein, Rhey and Joel A. Herr.

H. C. Demming, from the Committee on Legislation, submitted its report as follows:

To the Executive Committee of the Pennsylvania State Agricultural Society:

GENTLEMEN: Your committee appointed on legislation, having in view a special appropriation to this society by the Commonwealth of Pennsylvania, respectfully report that immediately after our selection we proceeded to work. Our efforts were first centered upon the drawing of a bill which would prove acceptable; and quite a number of drafts were made before a bill was agreed upon. Then a number of members of the legislature were called upon in reference to the proposed appropriation. A decided majority seemed to favor aiding us after our claims were laid before them; but when it became known that there would be opposition from a higher quarter, they gradually lost interest. A number of state officials, high in authority, were called upon, and we were lead to believe that they would favor the relief of the society. Many friends kindly aided us in various ways; but while the bill was in the house committee information reached the committee that Governor Beaver would undoubtedly veto the appropriation bill, if passed. The Governor was approached not only by the chairman of your committee, but by a number of others, including two or three gentlemen whom it was believed would lay all the merits of the case before him, but His Excellency could not see his way clearly to aid us through an appropriation by the state.

Gentlemen, residents not only of Harrisburg, but elsewhere in the state, were appealed to, both personally and by writing, and they came to our aid, but their efforts were of no avail. We are under special obligations to Joel A. Herr, Esq., and Ex-State Senator Wolverton for personal efforts in behalf of the bill.

We did all that we believed we were called upon to do, and more, and only regret that our efforts failed of success on account of the determined stand taken by the Governor not to permit this society to have an appropriation, on the ground that such appropriation would be unconstitutional.

Respectfully,

HENRY C. DEMMING,
D. W. SEILER,
J. S. WILHELM,
Committee.

On motion of Messrs. Zeigler and Taylor the report was received and ordered spread upon the minutes.

Secretary SEILER. Mr. Wilhelm is here, and as the next to the largest

creditor of the society—the Philadelphia and Reading Railroad Company being the largest creditor—I think it would be well to hear from him what was done in connection with the sale of the property.

Mr. WILHELM. It was last June or July that we first purchased the property. Then there seemed to be a question about our right to hold that property there. Mr. Weightman contested it. Vice President O'Brien (as well the counsel of the Philadelphia and Reading Railroad Company) was of the firm belief that we could hold possession of the grounds after the purchase; but the principal question was whether we should do so or not, as we had been holding it right along at considerable expense, and to have held it on would have required an annual expense of about \$3,100, including the taxes and rent. We then concluded to step down and out, and be thankful that it was no worse, and we did so. Thereupon Mr. O'Brien got Messrs. Thomas & Sons, the auctioneers, to go upon the grounds and sell the personal property about a week afterwards. The buildings were sold, and they telegraphed me that they did not realize \$2,500. The other personal property, I think, ran up to about \$1,500, or in that neighborhood—including the engine, shafting and everything that was there.

President McDOWELL. In all about \$4,000?

Mr. WILHELM. Yes, sir. There were no renters of the property, and there were no inducements to hold it longer.

President McDOWELL. The real estate is now back in the hands of the owner, Mr. Weightman?

Mr. WILHELM. Yes, sir.

President McDOWELL. It might be in order to ask relative to the rent coming from the Lehigh Avenue Passenger Railway Company?

Mr. WILHELM. That has been left in the hands of Mr. Weightman, the owner of the real estate. I think, however, that the \$1,000, due about the 1st of April, was paid to Mr. O'Brien, and that he made a return of it to Mr. Shaner. What was afterwards paid, if anything, went to Mr. Weightman, as Mr. O'Brien surrendered the lease to Mr. Weightman. After the sale was over, I understand that Mr. Weightman said we could have established the right to have and hold the grounds; but the question was whether to hold them and pay \$2,500 a year, or over that—\$1,800 as taxes, and \$1,000 a year rent—making the total outlay nearly \$3,000 a year, and no income.

President McDOWELL. Well, that is a clean wipe-out.

Mr. WILHELM. I thought at the time, I must say, that I had the feelings of Titus, after the destruction of Jerusalem,—

"It must be;
And yet it moves me, Romans!
It confounds
The counsels of my firm philosophy,
That ruin's merciless plough share must pass o'er
A barren salt, be sown on yon proud city."

The same can be said of the state agricultural society. I believe they are going to start a farm on the former grounds of our society. It was so taken and assessed.

Secretary SEILER. They can do so and save taxes.

Messrs. Demming, Wilhelm and Taylor were appointed tellers to conduct the election of officers on the morrow.

President McDOWELL. In reference to our claim before congress it is in a more favorable position than it has ever been. I hope to be able to make a still more favorable report hereafter.

Then there is the matter of adjusting in some way the claims of our creditors. It was my desire to have the committee meet me at Philadelphia some time during the year just closed, and have a conference on this important subject. I think I know the feeling of every creditor I have conversed with on the subject, and I believe that the members of the Society have no desire to wrong a single creditor out of a dollar. But we are hampered, and sorely so, as you all know. If we succeed ultimately in securing the appropriation from the state, which we should have, and the appropriation sought from congress, and some other help, I believe we can be placed on our feet again.

Mr. WILHELM. By the way, I would like to tell the committee a remark that Mr. O'Brien made to me some time ago. We were walking up and down the main building at the time. He said "Mr. Wilhelm, this whole thing is the result of the action of one man—the sale of these buildings, and the personal property of the society being wiped out." He added, "I have not a word to retract from what I told the gentlemen in Harrisburg last January. I have carried that out to the letter. But when the Philadelphia and Reading Railroad Company saw two officers of the society ready to pounce down upon us like a hawk, and jeopardize the interests of the society, as well as that of the Philadelphia and Reading Railroad Company, they could not sit by and see it done without an effort to protect themselves." He referred to Messrs. Doyle and Scott in obtaining the \$2,800 judgment. When that was done, it required that a step should be taken by the Philadelphia and Reading Railroad Company, resulting in the interests of the state society in Philadelphia being wiped out. But he said he was glad to see the smart men beaten.

President McDOWELL. I may state that Mr. O'Brien was honest in that statement; and that he had referred to that before—that he was required to do this.

Mr. WILHELM. He said that he regretted to have to do it; but it was necessary, or these smart men would not have been beaten. He added, "I will tell you now that the Philadelphia and Reading Railroad Company would not have taken that step if it had not been for Mr. Scott obtaining that judgment. They could not sit idly by and have their interests in such jeopardy.

Secretary SEILER. It is all over now.

Mr. WILHELM. Mr. O'Brien called attention to the fact, that we ought to have held an exhibition in Philadelphia last year. He said the whole thing could have been arranged.

A motion was made and adopted that the president be authorized to appoint a committee, consisting of Messrs. S. B. Rutherford, Hiram Young and Schall Wilhelm, to audit the treasurer's account.

The president appointed H. C. Demming, judge; J. Schall Wilhelm and William Taylor as tellers, to conduct the annual election.

The hour of twelve o'clock having arrived the polls were closed by order of chairman. The judge and tellers submitted the following report of vote cast:

We, the undersigned judges and tellers, appointed to conduct the election of officers of the Pennsylvania State Agricultural Society for the year 1890, have performed the duties, and certify the following to be correct:

President.

John McDowell. 45

First Vice President.

W. F. Rutherford	45
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Vice Presidents.

1. L. H. Twaddell,	45
2. Thomas J. Jordon,	45
3. Benj. S. Kunkel,	45
4. Robert C. Ogden,	45
5. George H. Smith,	45
6. David H. Branson,	45
7. William H. Holestein,	45
8. Wm. Taylor,	45
9. B. J. McGrann,	45
10. Daniel H. Neiman,	45
11. D. J. Waller,	45
12. Ira Tripp,	45
13. Hiram Young,	45
14. Gabriel Hiester,	45
15. Joseph Piollet,	45
16. Joel A. Herr,	45
17. John A. Lemon,	45
18. John S. Miller,	45
19. J. Schall Wilhelm,	45
20. R. J. C. Walker,	45
21. George Rhey,	45
22. W. W. Speer,	45
23. Jos. S. McKean,	45
24. J. A. Quay,	45
25. J. D. Kirkpatrick,	45
26. J. C. Thornton,	45
27. Wm. Powell,	45
28. John A. Woodward,	45

Additional Members, Executive Committee.

W. F. Rutherford,	45
Geo. D. Stetzel,	45
John H. Ziegler,	45
Jefferson Shaner,	45
Henry Palmer,	45

Corresponding and Recording Secretary.

D. W. Seiler.	45
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Treasurer.

John J. Nissley.	45
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Chemist and Geologist.

A. L. Kennedy.	45
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Librarian.

Wm. H. Egle.	45
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Stenographer.

H. C. Demming. 45

H. C. DEMMING, *Judge*,
J. SCHALL WILHELM,
WM. TAYLOR,*Tellers.*

On motion the meeting adjourned.

January 15, 1890.

The regular session of the society convened at ten o'clock, forty-five members being present. On motion, Mr. Bergner was elected chairman of the meeting. The chairman then directed the voting for officers for the ensuing year to proceed.

The committee appointed to audit the account of the treasurer, submitted the following report, which, upon motion, was adopted and the committee discharged:

JOHN J. NISSLEY, *treasurer, in account with Pennsylvania State Agricultural Society.*

1889.

DR.

Jan. 19. Balance in treasury,	\$1, 438 41
29. Cash from W. H. Scott, balance in his hands after paying printing bills,	23 91
Feb. 13. Cash from A. Oppenheimer, for use of grounds,	180 15
Mar. 15. Cash from A. H. O'Brien, for use of grounds,	28 79
April 6. Cash from Lehigh Avenue Railway Company, for permission to occupy grounds,	1, 000 00
May 15. Cash from A. H. O'Brien, for permission to dump on grounds,	60 00
24. Cash from A. H. O'Brien, for permission to dump on grounds,	60 00
Cash from secretary for fifty annual memberships,	100 00
Cash from Jefferson Shaner, amount transferred to him by A. H. O'Brien, for use of grounds,	529 81
Cash from Shaner for permission to dump grounds,	64 00
Cash from Shaner for rent of stalls,	30 00
Cash from Shaner for lumber sold,	19 13
Cash from York County Agricultural Society on ac- count of one share in proceeds of the exhibition,	1, 000 00
	<u>\$4, 534 21</u>

CR.

Cash paid expenses of executive committee,	\$90 15
Rent of office at Harrisburg and grounds at Philadelphia,	562 50
Printing,	21 00
Premiums,	218 00
Paid D. W. Seiler, secretary, on old account, salary,	100 00
Superintendence, labor and watchmen, Philadelphia,	1, 225 00

2 AGR. SOC.

Paid judgment, Nolan <i>vs.</i> Society and attorney fees,	\$300 00
Cash refunded Owen McKenna paid by him for permission to dump dirt on grounds,	350 00
Expense president's office,	140 00
Expense secretary's office,	86 43
Expense treasurer's office,	48 50
D. W. Seiler, secretary, on account of salary,	1,000 00
John J. Nissley, treasurer, on account of salary,	300 00
Balance,	92 63
	<hr/>
	\$4,534 21

The undersigned committee appointed to audit the accounts of John J. Nissley, treasurer, find the above statement correct.

J. SCHALL WILHELM, *Chairman*,
HIRAM YOUNG,
S. B. RUTHERFORD.

EXECUTIVE COMMITTEE.

January 15.

President McDowell called the newly elected executive committee to order, and took the opportunity to thank the society for honoring him a third time. He pledged the society renewed energy in the discharge of his duties and asked for the earnest assistance of every member.

On motion of Mr. Seiler, a committee of three was appointed to draft suitable resolutions on the death of Ex-President Haldeman, Vice Presidents Mackey and Keller.

On motion of Mr. Demming, the president was authorized to appoint the usual committee of arrangements for this year, with full power as heretofore.

Mr. Rutherford offered the following resolution:

That the president be elected chairman of the executive committee.
The resolution was adopted.

Mr. Wilhelm suggested the appointment of a committee to call upon the creditors that an adjustment of the claims against the society might be made. On motion the matter was referred to the executive committee.

The committee then adjourned.

LIST OF PREMIUMS

Awarded by Joint Exhibition under the management of Pennsylvania State Agricultural Society and York County Agricultural Society, October 6 to 11, 1890, at York.

CLASS A—BLACK POLLED.

Division A—Registered.

J. P. Hime, herd of 9 head, special premiums, \$100; do bull 3 years old and upwards, 15; do bull between 2 and 3 years old, 12; do bull between 1 and 2 years old, 9; do cow 3 years old and upwards, 12; do heifer or cow between 2 and 3 years old, 8; do do between 1 and 2 years old, 6.

Division B—Unregistered.

Samuel Haldeman, bull between 2 and 3 years old, \$10; do cow 3 years old and upward, 10; do cow or heifer between 2 and 3 years old, 8.

CLASS B—DIVISION B.

Red Polled Unregistered.

H. S. Stick, best bull between 1 and 2 years old, \$7.
H. S. Stick, best heifer between 1 and 2 years old, 6.
H. S. Stick, heifer between 1 and 2 years, 3.

CLASS 1—DIVISION A.

STALLIONS, MARES AND COLTS.

Perchern (full bred).

E. H. Zeigler, best stallion 6 years old and upwards, dip. and \$15.
Charles F. Baer, 2d do 10.
Michael Schall, best stallion between 4 and 6 years old, 12.
A. S. Warden, best brood mare (to have colt under 2 years with her), 8.

DIVISION B—Clydesdale—(full bred).

S. K. Nissley, best stallion 6 years old and upwards, dip. and \$15.
Milton Neiman, 2nd best do 10.
O. W. Brubaker, best stallion between 4 and 6 years old, 12.

DIVISION C—French Coach—(full bred).

S. K. Nissley, best stallion 6 years old and upwards, dip. and \$15; do 2d best do 10.

DIVISION D—For Heavy Draught.

Edward Brillhart, best stallion 6 years old and upwards, dip. and \$15.
Jacob Grave, 2nd best do 10.
J. W. Eshelman, best stallion between 4 and 6 years old, 12.

John F. Motter, 2nd best do 6.
 H. S. Forry, best stallion under 4 years old, 10.
 J. W. Eshelman, 2nd best do 5; do best brood mare to have colt under 2 years with her, 8.
 William Ramer, 2nd best do 5.
 Wm. S. Jones, best mare colt between 3 and 4 years old, 6.
 F. W. Hoopes, best horst colt between 2 and 3 years old, 4.
 John Rutter, 2nd best do 2.
 J. W. Eshelman, best mare colt between 2 and 3 years old, 4.
 E. G. Martin, 2nd best do 2.
 William Givens, best horse between 1 and 2 years old, 3.
 P. W. Burg, 2nd best do 2.
 John B. Kendig, best mare colt between 1 and 2 years old, 3.
 E. G. Martin, best colt under 1 year old, 2.
 J. W. Eshelman, sire with three of his colts, sired this present year, one-half of premium to sire, colts each to receive \$5, \$30.

CLASS 2—DIVISION A.

Stallions, Mares and Colts. For quick draught (Standard Bred).

Daniel G. Engle, stallion 6 years old and upwards, dip. and \$15.
 Milton Sultzbaugh, 2nd best do 10; do best do between 4 and 6 do 12.
 J. W. Brickhart, 2nd best do 6.
 Milton Sultzbaugh, best do under 4 years old, 10.
 Levi Wallace, 2nd best do 5.
 Milton Sultzbaugh, best brood mare to have colt under 2 years old with her, 8.
 York Co. Horse Breeders' Association, 2nd best do 5.
 Michael Schall, best horse colt between 3 and 4 years old, 6.
 J. W. Brickhart, best mare colt do 6.
 Milton Sultzbaugh, 2nd best do 3; do best horse colt do 2 and 3 do 4.
 York Co. Horse Breeders' Association, best mare do 4; do best do 1 and 2 do 3.
 Dr. J. D. Heiges, best colt under 1 year old, 2.
 Milton Sultzbaugh, 2nd best do 1.

Division B—Quick Draught.

Michael Schall, stallion 6 years old and upwards dip. and \$15.
 John S. Klins, 2nd best do 10.
 S. K. Nissley, best stallion between 4 and 5 years old 12.
 R. N. Meisenhelter, 2nd best do 6.
 J. W. Brickhart, best do under four years old 10.
 Dr. J. D. Heiges, 2nd best do 5.
 Henry Jacob, best brood mare to have colt under 2 years with her 8.
 H. S. Forry, 2nd best do 5.
 Samuel Rutter, best horse colt between 3 and 4 years old 6.
 John Rutter, 2nd best do 3.
 John S. Dabeler, best mare do 6.
 Philip Harman, best horse do 2 and do 4.
 Samuel Rutter, 2nd best do 2.
 Daniel Smith, best mare do 4.
 Wm. Givens, best horse colt between 1 and 2 years old 3.
 Henry Jacobs, 2nd best do 2.
 Edward Sweitzer, best mare do 3.

Wm. Givens, 2nd best do 2.
J. W. Brickhart, best colt under 1 year do 2.
Henry Jacobs, 2nd best do 1.

CLASS 3.

MATCHED HORSES, GELDINGS, MARES, DRAUGHT HORSES AND MULES.

Dr. W. F. Bacon, best pair carriage horses, \$10.
Harry Grey, best do roadsters, \$10.
Albert Smyser, 2nd best do do 6.
Jno. D. Dabblers, best horse mare for single harness, 6.
W. H. Hamm, 2nd best do do 4.
Dr. A. A. Wasson, best stallion, gelding or mare for saddle, 6.
S. S. Wagner 2nd best do do 3.
J. W. Brickhart, best walking horse or mare, 6.
Samuel L. Bahn, 2nd best do do 4.
J. C. Schmidt, best pair matched draught horses, 6.
Michael Schall, best jack, 6.
Henry Jacobs, best mule colt, 3; do 2nd best do 2.
Michael Schall, 2nd best do special, 2.

CLASS 4.—DIVISION A.

Durhams or Short Horns, Registered.

C. E. Carothers, herd of 9 head, special premium \$100.
Herman Hoke, best do 50.
Jacob C. Rutter, best bull 3 years old and upwards, 15.
S. W. Sollenberger, best do between 2 and 3 years old, 12.
C. E. Carothers, 2nd best do 6.
S. W. Sollenberger, best bull calf under 12 months, 3.
C. E. Carothers, 2nd best do 2.
Jacob C. Rutter, best cow 3 years old and upwards, 12; do 2nd best do 6;
do best heifer or cow between 2 and 3 years old, 10.
S. W. Sollenberger, best heifer calf under 12 months 3.
C. E. Carothers, 2nd best do 2.

DIVISION B.

Durhams or Short Horns, Unregistered.

Michael Mersberger, best herd of 9 head, \$40.
H. S. Forry, best bull 3 years old and upwards, 12.
J. F. Glatfelter, 2nd best do 6.
H. S. Forry, best bull between 2 and 3 years old 10.
Samuel F. Bahn, best do 1 and 2 years old 7.
D. S. Snook, do 3.
J. F. Glatfelter, best bull calf under 12 months 2.
D. J. Snook, 2nd best do 1.
Jacob C. Rutter, best cow 3 years old and upwards 10.
Herman Hoke, 2nd best do 5.
D. J. Snook, best heifer or cow between 2 and 3 years old 8.
J. F. Glatfelter, 2nd best do 4; do best heifer between 1 and 2 years old
6; do 2nd best do 3.
Jacob C. Rutter, best heifer calf under 12 months 2.
H. S. Forry, 2nd best do 1.

CLASS 5.—DIVISION A.

Devons.—Registered.

- A. S. Worden, herd of 9 head special premium \$100.
G. W. Shaffer, do 1st premium 50.
Peter Shellenberger, bull between 2 and 3 years old 12.
G. S. Grove, 2nd best cow 3 years old and upwards 6.
Israel Stambaugh, best heifer or cow between 2 and 3 years old 10; do 2nd best do 5.
A. S. Worden, best heifer calf under 12 months 3.

DIVISION B.—UNREGISTERED.

Devons.

- Peter Shellenberger, best bull 3 years old and upward \$12.00.
Daniel Smith, best bull between 2 and 3 years old, 10; do best bull calf under 12 months 2; do best cow 3 years old and upward 10.
G. W. Shaffer, heifer or cow between 2 and 3 years old 8.
Daniel Smith 2nd best do 4; do best do between 1 and 2 years old 6; do 2nd best do 3.
Peter Shellenberger, heifer calf under 12 months 2.
Daniel Smith, 2nd best do 1.

CLASS 6—DIVISION A.

Ayrshires.—Registered.

- E. A. Fobes, herd of 9 head, special premium \$100.
William Lindsay, best herd of 9 head 50; do best bull 3 years and upwards 15.
E. A. Fobes, best bull between 2 and 3 years old 12 do 1 and 2 years old 9.
William Lindsay, best bull calf under 12 months 3.
E. A. Fobes, 2nd best do 2.
William Lindsay, best cow 3 years old and upward 12; do 21 best do 6.
E. A. Fobes, best heifer or cow between 2 and 3 years old 10.
William Lindsay, 2nd best do 5.
E. A. Fobes, best heifer or cow between 1 and 2 years old 8.
J. D. Blunt, 2nd best do 4; do best heifer calf under 12 months 3.

DIVISION B.—UNREGISTERED.

Ayrshires.

- George D. Rutter, best bull calf under 12 month \$2; do best cow 3 years old and upwards 10; do best heifer or cow between 2 and 3 years old 8; do best heifer between 1 and 2 years old 6; do 2nd best do 3.

CLASS 7—DIVISION A.

Jerseys.—Registered.

- F. C. Hutton, herd of 9 head, special premium, \$100.
R. N. Meisenhelter, best herd of 9 head 50.
F. C. Hutton, best bull 3 years old and upward 15.
R. N. Meisenhelter, best bull between 2 and 3 years old 12.

- F. C. Hutton, 2nd best do 6; do best bull between 1 and 2 years old 9; do best bull calf under 12 months 3.
R. N. Meiserhelter, 2nd best do 2; do best cow 3 years and upward 2; do 2nd best do 6.
F. C. Hutton, best cow or heifer between 2 and 3 years old 10.
R. N. Meisenhelter, 2nd best do 5.
F. C. Hutton, best heifer between 1 and 2 years old 8; do best heifer calf under 12 months 3.

DIVISION B.—UNREGISTERED.

Jerseys.

- J. D. Blunt, best herd of 9 head \$40.
J. G. Peters, York, Pa., best bull between 1 and 2 years old 7.
Albert Smyser (of D), best cow 3 years old and upward 10.
J. G. Peters, best cow or heifer between 2 and 3 years old 8; do best heifer between 1 and 2 years old 6.
Albert A. Sharp, best heifer under 12 months 2.

CLASS 8—DIVISION A.

Guernsey, Registered.

- M. L. Greider, herd of 9 head special premium \$100.
William Lindsay, best herd of 9 head 50; do best bull 3 years old and upwards 15.
J. D. Blunt, 2nd best do 7.
J. Krause, best bull between 2 and 3 years old 12.
J. D. Blunt, best do 1 and 2 years old 9.
M. L. Greider 2nd best do 4.
William Lindsay, best bull calf under 12 months 3.
J. D. Blunt, best cow 3 years old and upward 12.
M. L. Grider, 2nd best do 6.
J. D. Blunt, best cow or heifer between 2 and 3 years old 10.
M. L. Greider, 2nd best do 5.
William Lindsay, best heifer between 2 and 3 years old 8.
M. L. Greider, 2nd best do 4.
J. D. Blunt, best heifer calf under 12 months 3.
William Lindsay, 2nd best do 2.

DIVISION B.

Guernseys Unregistered.

- Michael Schall, best herd of 9 head \$40.
Jacob Fink, best bull 3 years old and upward 12.
Michael Schall, best bull between 2 and 3 years old 10.
William Lindsay, best do 1 and 2 years old 7; do cow 3 years old and upward 10.
Michael Schall 2nd best do 3.
William Lindsay, best cow or heifer between 2 and 3 years old 8; do best heifer between 1 and 2 years old 6; do best heifer calf under 12 months 2.

CLASS 9—DIVISION A.

Herefords—Registered.

- George O. Holcomb, herd of 9 head special premium \$100.00.
G. W. Millikins, best do 50.

Creed and Haskell, best bull 3 years old and upwards, 15.
 Geo. O. Holcomb, bull between 2 and 3 years old, 12.
 G. W. Millikins, 2nd best do 6.
 George O. Holcomb, best do 1 and 2 years old, 9; do best bull calf under 12 months, 3.
 G. W. Millikins, 2nd best do 2.
 Creed and Haskell, best cow 3 years old and upwards, 12.
 George O. Holcomb, 2nd best do 6.
 Creed and Haskell, best cow or heifer between 2 and 3 years old, 10.
 G. W. Millikins, 2nd best do 5.
 George O. Holcomb, best heifer between 1 and 2 years old, 8; do 2nd best do 4; do best heifer calf under 12 months, 3; do 2nd best do 2.

DIVISION B.—UNREGISTERED.

Herefords.

H. J. Haskell, best herd of 9 head, \$40.00; do best bull 3 years old and upwards, 12.
 Michael Schall, best do between 2 and 3 years old, 10.
 H. J. Haskell, best do calf under 12 months, 2.
 G. W. Millikins, best cow 3 years old and upwards, 10.
 H. J. Haskell, 2nd best do 5; do best cow or heifer between 2 and 3 years old, 8.
 Michael Schall, 2nd best do 4.
 G. W. Millikins, best heifer calf under 12 months, 2.
 H. J. Haskell, 2nd best do 1.

CLASS 10—DIVISION A.

Holstein or Dutch Belted—Registered.

J. G. Paxton & Sons, herd of 9 head, special premium, \$100.
 Wm. H. Biggs & Co., do 1st premium, 50.
 W. G. Snook, bull 3 years old and upwards, do 15.
 Hiram E. Horting, do 2nd do 7.
 A. W. Kest, bull between 2 and 3 years old 1st premium, 12.
 W. G. Snook, do 1 and 2 years old do 9.
 J. G. Paxton & Sons, best calf under 12 months old, do 3.
 W. G. Snook, do 2nd do 2.
 Hiram E. Horting, cow 3 years old and upwards, 1st premium, 12.
 W. G. Snook, do 2nd do 6.
 Hiram E. Horting, best cow or heifer between 2 and 3 years old, 10.
 Wm. H. Biggs & Co., 2nd best do 5; do best heifer between 1 and 2 years old, 8.
 John B. Kendig, 2nd best do 4.
 W. G. Snook, best heifer calf under 12 months, 3.
 Wm. H. Biggs & Co., 2nd best do 2.

DIVISION B.—UNREGISTERED.

Holsteins.

Hiram E. Horting, best bull 3 years old and upwards, \$12; do best bull calf under 12 months, 2; do 2nd best 1; do best cow 3 years old and upwards, 10; do best cow or heifer between 2 and 3 years old, 8.
 A. W. Kast, best heifer calf under 12 months, 2; do 2nd best do 1.

CLASS 10½—DIVISION A.

Dutch Belted.

- H. B. Richards, herd of 9 head, special premium, \$100.
R. B. Frankenfield, best bull 3 years old and upwards, 15; do best do between 1 and 2 years old, 9.
H. B. Richards, best bull calf under 12 months, 3; do 2nd best do under 12 months, 2.
R. B. Frankenfield, best cow 3 years old and upwards, 12; do 2nd best do 6; do best cow or heifer between 2 and 3 years, 8; do 2nd best do 4; do best heifer calf under 12 months, 3.
H. B. Richards, 2nd best do 2.
R. B. Frankenfield, best heifer between 1 and 2 years, 8; do 2nd best do 4.

DIVISION B.

- Samuel Haldeman, best bull between 1 and 2 years, 7; do best cow 3 years old and upwards, 10; do best cow or heifer between 2 and 3 years, 8; do best heifer between 1 and 2 years, 6.

CLASS 11.

Natives and Grades Working Oxen and Fat Cattle.

- Henry Jacobs, best bull between 2 and 3 years old, \$8.
George D. Rutter, 2nd best do 4.
Albert Smyser (of D), best bull between 1 and 2 years old, 6.
George D. Rutter, 2nd best do 3.
D. J. Snook, best bull calf under 12 months, 2.
Albert M. Ebert, best cow 3 years and upwards, 10.
Hiram E. Horting, 2nd best do 5.
Eli Neiman, best cow or heifer between 2 and 3 years old, 5.
A. W. Kast, 2nd best do 3.
Hiram E. Horting, best heifer between 1 and 2 years old, 5.
D. J. Snook, 2nd best do 3.
Albert M. Ebert, best heifer calf under 12 months, 2.

Fat Cattle.

- George O. Holcomb, best fat steer, \$10.
J. P. Hime, 2nd best do 5.
George O. Holcomb, best do heifer, 10.
J. P. Hime, 2nd best do 5.

CLASS 12.

SHEEP DEPARTMENT.

Cotswold.

- C. E. Carothers, best ram, over 3 years old, \$8; do do best 2 years old 6; do ram lamb, 2nd best, 1; do best 3 ewes 2 years old, 6; do best 3 ewes 1 year old 4; do do 3 ewe lambs, 2.
W. G. Snook, best 3 ewes over 3 years old, 8.
E. G. Martin, 2nd best 3 ewes over 3 years old, 4.

Southdown.

- Albert A. Sharp, best ram over 3 years old, \$8.
R. W. Anderson, 2nd do do 4.

- A. D. Barnes, best 3 ewes over 3 years old, 8.
Albert A. Sharp, 2nd do do 4.
A. D. Barnes, 2nd do 3 ewe lambs, 1.

Oxfordshires.

- A. D. Barnes, best ram over 3 years old, \$8; do do 2 years old, 6.
D. Strickler, 2nd do 3; do best ram 1 year old, 4.
A. D. Barnes, best ram lamb, 2; do do 2nd do, 1; do best 3 ewes over 3 years old, 8.
D. Strickler, 2nd do do, 4.
A. D. Barnes, best 3 ewes 2 years old, 6.
D. Strickler, 2nd do do, 3.
A. D. Barnes, best 3 ewes 1 year old, 4.
D. Strickler, 2nd do do, 2.
A. D. Barnes, best 3 ewe lamb, 2.

Shropshires.

- A. D. Barnes, best ram over 3 years old, 8; do 2 years old, 6; do 1 year old, 4.

Black Top Merinoes.

- J. G. Paxton & Sons, best ram over 3 years old, 8; do 2 years old, 6; do 1 year old, 4; do 3 ewes over 3 years old, 8; do 3 ewes 1 year old, 4.

Dorset Horn.

- D. Strickler, best ram 2 years old, \$6; do ram lamb, 2; do 3 ewes 2 years old, 6; do 3 ewe lambs, 2.

Leicesters.

- O. W. Brubaker, best ram over 3 years old, \$8.
W. H. Miller, do 1 year old, 4.
O. W. Brubaker, do ram lamb 2; do 2d best do 1; do best 3 ewes over 4 years old, 8.
W. H. Miller, do 1 year old, 4.
O. W. Brubaker, best 3 ewe lambs, 2; do do 1

Lincolns.

- Henry Wehler, best ram over 3 years old, \$8.
R. W. Anderson, do 2 years old, 6.
Peter Shellenberger, 2nd best do 3.
D. A. Wilson, best ram 1 year old, 4.
Peter Shellenberger, best ram lamb, 2.
Henry Wehler, best 3 ewes over 3 years old, 8.
Peter Shellenberger, 2nd best do 4.
Henry Wehler, best 3 ewes 1 year old, 4.
Peter Shellenberger, 3 ewe lambs, 2.

Natives or Mixed Blood.

- Edward Brillhart, best ram over 3 years old, \$8.
Philip Harman, best ram lamb, 2.
Edward Billhart, 2nd best do 1.
Philip Harman, best 3 ewes over 3 years old, 8.
W. G. Snook, 2nd best do 4; do best 3 ewes 2 years old, 6.

Edward Brillhart, 2nd best do 3; do best 3 ewe lambs, 2.
R. W. Anderson, 2nd best do, 1.

CLASS 13.—SWINE.

Chester.

M. L. Greider, best boar over 2 years old, \$6.
E. B. Ashbridge, 2nd best do, 3.
O. W. Brubaker, best boar 1 year old, 4.
Caleb Wogan, best breeding sow over 2 years old, 6.
O. W. Brubaker, 2nd best do, 3.
Caleb Wogan, best do 1 year old, 4.
O. W. Brubaker, 2nd best do, 2.
M. L. Greider, best lot of pigs under 6 months old, 2.
Caleb Wogan, 2nd best do, 1.

Poland China.

C. E. Carothers, best boar over 2 years old, \$6.
Jacob Grove, 2nd best do 3.
O. W. Brubaker, best boar 1 year old, 4.
C. E. Carothers, 2nd best do, 2.
O. W. Brubaker, best breeding sow over 2 years old, 6.
P. W. Weigle, 2nd best do, 3.
Jacob Grove, best do 1 year old, 4.
C. E. Carothers, 2nd best do, 2.
Samuel F. Bahn, best lot of pigs under 6 months, 2.
O. W. Brubaker, 2nd best do, 1.

Berkshires.

John B. Kendig, best boar over 2 years old, \$6.
S. W. Sollenberger, 2nd best do, 3.
P. W. Weigle, best do 1 year old, 4.
S. W. Sollenberger, 2nd best do, 2.
Daniel S. Hamm, best breeding sow over 2 years old, 6.
S. W. Sollenberger, 2nd best do, 3.
W. G. Snook, best do 1 year old, 4.
Geo. D. Rutter, 2nd best do, 2.
W. G. Snook, best lot of pigs under 6 months, 2.
John B. Kendig, 2nd best do, 1.

Yorkshires.

J. G. Paxton & Sons, best boar over 2 years old, \$6; do 2nd best do, 3.
Wm. Lindsay, best do 1 year old, 4.
W. G. Snook, 2nd best do, 2.
J. G. Paxton & Sons, best breeding sow over 2 years old, 6.
W. G. Snook, 2nd best do, 3.
J. G. Paxton & Sons, best do 1 year old, 4; do 2nd best do, 2; do best lot of pigs under 6 months, 2; do 2nd best do, 1.

Cheshires.

A. D. Barnes, best boar over 2 years old, \$6; do best do 1 year old, 4.
W. G. Snook, 2nd best do, 2.
A. D. Barnes, best breeding sow over 3 years old, 6; do 2nd best do 3;
do best do 1 year old, 4; do best lot of pigs under 6 months, 2; do
2nd best do, 1.

Suffolk.

J. D. Blunt, best boar 1 year old, \$4; do best breeding sow 1 year old, 4; do 2nd best do 2.

Essex.

William Lindsay, best boar over 2 years old, \$6; do best boar 1 year old, 4.

J. D. Blunt, 2nd best do 2.

William Lindsay, best breeding sow over 2 years old, 6; do 2nd best do 3; do best do 1 year old, 4.

J. D. Blunt, 2nd best do 2.

William Lindsay, best lot of pigs under 6 months 2; do 2nd best do 1.

CLASS 14.

POULTRY, PIGEONS AND PET QUADRUPEDS.

Asiatic.

Dr. A. C. Treichler, Light Brahmas, \$2.

H. C. Ginter, Dark do 2.

J. O. Frey, White Cochins, 2.

H. C. Ginter, Black do 2.

H. C. Ginter, Buff do 2.

Jacob D. Schall, Langshans, 2.

Hamburgs.

Henry Schlle, Golden Spangled Hamburgs, \$2.

C. E. Small, Silver Spangled do, 2.

Henry Schlle, Golden Penciled do, 2.

C. E. Small, Silver do, 2.

Henry Schlle, White do, 2.

Spanish.

H. C. Ginter, Black Spanish white-faced, \$2.

David Ziegler, White Leghorns, single comb, 2.

H. C. Ginter, Brown, do single comb, 2.

Henry Schlle, Black do, 2.

H. C. Ginter, Minorca White, 2.

J. H. Bott, do Black, 2.

French.

H. C. Ginter, Houdans, \$2.

Polish.

H. C. Ginter, White Polish, \$1.

S. Krouse, Golden do bearded, 1.

Game.

H. C. Ginter, Black Breasted Red Games, \$2; do Brown do, 2.

J. Krouse, Silver Duck Wing Games, 2; do Golden do 2; Red Pale Games, 2.

H. C. Ginter, Black Games, 2; do White Pile do 2; do Black Red Malays, 2.

Chas. H. Frey, Black Sumatras, 2.

Game Bantams.

B. Wallick, Black Breasted Red Game Bantams, \$2.

William Laumaster, Golden Duck Wing do, 2.

Adam Hoke, Silver do, 2.

H. C. Ginter, White Bantams 2; do Black do 2; do Red Pile Game Bantams, 2.

Bantams, other than Games.

William Laumaster, Golden Seabright Bantams, \$2; do Black Rose Comb do, 2.

B. Wallack, Silver Seabright do 2; do White Rose Comb do 2.

Kinter & Co., Japanese Black Tailed do 2; do Indian Game do 2.

H. C. Ginter, White Georgian Games, 2.

American.

M. L. Greider, Plymouth Rocks, barred, \$1.

Robert Smith, Wyandottes, silver-laced, 1.

Kinter & Co., do Golden do, 1.

H. C. Ginter, do White 1; do Javas, black, 1.

Miscellaneous.

Mrs. W. H. Herman, Silkies, \$1.

J. M. Mellinger, Silver-laced Wyandottes, special premium \$1; do White Leghorns, single comb do 2; do White Leghorns, rose comb, do 2; do Brown do rose do 2; do Plymouth Rock, barred do 1; do Brown Leghorns, single comb do 2; do Black Breasted Red Games, do 2.

Turkeys.

Alawese Gruver, Bronze Turkeys, \$2.

Daniel Naylor, Gray do 2.

Ornamental.

Joseph Petre, Peacocks \$2; holder of ticket No. 596, Pearl Guinea Fowls, 2.

Geese.

Dr. A. Stouch, Toulouse, \$2.

Ducks.

R. S. Cramer, Rouen, \$1.

J. O. Frey, Alvesbury 1; do Cayuga 1; do Pesin 1; do White Crested 1.

Daniel Naylor, Muscovy Ducks, colored, 1.

Geo. D. Rutter, Common 1.

Pigeons.

Dr. J. B. Kain, Pouters 50c.

W. A. Myers, Carriers 50; do Barbs 50.

A. S. Warden, Tumblers, short-faced 50.

R. T. Cramer, do common 50; do Turbits, solid color 50; do winged 50; do Owls, solid color 50; do Dragoons 50; do Nuns 50; do Antwerps 50.

M. L. Greider, Fan Tails 50.

B. Wallick, Jacobins 50; do Trumpeters 50.

Michael Mersber, Swallows 50; do striped 50; do yellow 50; do red 50; do Archangel, yellow 50; do copper 50.

Jacob Brillinger, Dutchies 50.

Pet Quadrupeds.

- William Lutz, Eng. rabbits 50c.
 J. C. Heiges, guinea pigs 50.
 J. C. Crape, Lop Eared or Madagascar rabbits 50.
 J. H. Baumgardner, white rats 50.
 B. J. King, Beagle dogs 50.
 John Rebert, English Spaniel dog 50.
 D. G. Schroeder, pair English Pugs 50.

CLASS 15.

FLOUR, MEAL, GRAIN AND SEEDS.

- R. K. Allison, best barrel roller process flour, diploma and \$2.
 C. E. Miller, best barrel family flour, 2.
 George L. Allison, best barrel extra flour, dip. and 2.
 B. F. Allison, best barrel superfine flour, dip. and 2.
 Andrew Miller, best barrel rye flour, dip. and 2.
 R. K. Allison, best display of flour in sacks, 2.
 Henry Helman, buckwheat meal, 1.
 M. L. Greider, best bushel amber wheat, 1.50.
 W. A. Druck, best bushel rye, 1.50.
 Lewis Strayer, best bushel native corn, 1; do best yellow corn, 1; do best oats, 1; do best clover seed, 1.50.
 M. L. Greider, best bushel barley, 1.
 R. M. Anderson, best half bushel timothy seed, 1.50.
 Jno. M. Allison, best bushel buckwheat, 1.
 Lewis Strayer, best sample newly introduced grain valuable to farmers, dip. and 1.50.
 M. L. Greider, best Canada wonder wheat, 1.50; do best Mediterranean wheat, 1.50; do white Norway rye, 1.50.
 F. M. Bahn, best oat meal, 1.
 Lewis Strayer, best sunflower seed, 50.
 D. N. Wilson, best Fultz wheat, 1.50.
 H. S. Myers, best oil meal, 1.

CLASS 16—VEGETABLES.

Beans.

- Peter Kunkle, Lima beans, 50 cents.
 Samuel Myers, soup do 50.
 Joseph Stauffer, butter do 50.
 W. H. Weiser, wax do 50.

Beets.

- Samuel Jacobs, $\frac{1}{2}$ bushel red beets, 50 cents.

Cabbage.

- Albert A. Sharp, flat Dutch, three specimens, 50 cents.
 Samuel Jacobs, drumhead, 50.
 Granville Glatfelter, single specimen, 50.

Carrots.

- Jno. C. Weiser, early horn, 50 cents.
 Granville Glatfelter, long orange, 50.

Squashes.

James A. Stahle, Rose Dale cott, 50.
Charles Lease, Patapan, 50.

Miscellaneous.

James A. Stahle, yellow preserving tomatoes, \$1.
Charles Lease, $\frac{1}{4}$ bushel intermediate carrots, 50.
George Erlinger, 5 stalks celery any variety, 50.
L. Lefever, do white, 50.
Geo. D. Rutter, sugar or sweet corn, 50.
Lewis Strayer, parching or pop corn, 50.
James A. Stahle, Rosedale sweet corn, 50.
J. T. Brown, dried sweet corn, 50.
William H. Wise, cucumbers for pickling, 50.
Peter Kunkle, round purple egg plants, 50.
William H. Weiser, black Pekin egg plant, 50.
Mrs. W. C. Kraber, another variety egg plant, 50.
Marcellus P. Diehl, endive, 50.
Jno. C. Weiser, horse radish, 50.
Charles Lease, kohlrabi, 50.
Granville Glatfelter, leeks, 50.
Samuel Holl, lettuce, 50.
Jno. C. Weiser, martynia, 50.
William H. Weiser, okra, 50.

Onions.

Jno. C. Weiser, table onions, 50 cents.
Jno. P. Hines, red do, 50.
Daniel Naylor, white do, 50.
Samuel Myers, seed parsnips, 50.
Granville Glatfelter, long smooth do, 50.
Jno. C. Weiser, blue Peter peas, 50.

Peppers.

Mrs. W. C. Kraber, golden sweet peppers, 50.
Granville Glatfelter, long Cayenne do 50.

Potatoes.

P. W. Burg, Peruvian early, \$1.
J. P. Hines, Early Rose, 1.
Jacob Smyser, Late Rose, 1.
J. W. Huntzburger, Peerless, 1.
P. W. Burg, Early Ohio, 1.
Samuel Jacobs, Prolific, 1.
Albert Smyser, of D., Burbanks, 1.
Emanuel Herman, Victory Blue, 1.
Granville Glatfelter, White Star, 1.
Samuel Jacobs, Monmouth Pearl, 1.
P. W. Burg, roses beauty of beauties potatoes, 1.
L. Lefever, Monroe Seedling, 1.
James Stahle, Burpees Extra Early, 1.
Lewis Strayer, Extra Early Essex, 1.
H. T. Crone, Queen of Valley, 1.

Henry Sleeper, Bill Nye, 1.
 C. F. Beck, Maine, 1.
 Henry Sleeper, Rochester Favorite, 1.
 Jno. A. Stair, Silverskin, 1.
 Samuel F. Bahn, stalk curled parsley, 50.

Pumpkins.

Geo. H. Miller, heaviest specimen, \$1.
 W. H. Wiest, Turkish Crown, 50.
 W. A. Druck, sweet pumpkin, 50.
 B. H. Stoner, cashaw do 50.

Radishes.

Jno. C. Weiser, bunch of table radishes, 50.
 Jno. Kain, white Chinese do 50.
 Jno. H. Weiser, rose Winter do 50.
 James Reisinger, display of radishes, 50.
 Granville Glatfelter, salsify.
 Lewis Strayer, Strayer's custard squashes, 50.
 Eliza Boeckel, hubbard do 50.
 J. P. Hines, sweet potatoes home raised, 50.

Tomatoes.

Granville Glatfelter, Acme tomatoes, \$1.
 Wm. H. Weiser, Golden Jubilee do 1; do do Matchless do 1.
 J. P. Hines, hybrid do 1.
 Joseph Shaffer, New Volunteer do 1.

Turnips.

Wm. H. Wise, 1 bus. turnips, 50c.
 P. W. Burg, 12 specimens for table use, 50.
 James A. Stahle, strap heaved 5 tops, 50.
 E. H. Miller, King of Valley, 50.
 Charles Lease, $\frac{1}{2}$ bus. yams, \$1.

Peppers.

Mrs. W. C. Kraber, stalk pepper, 50.
 Joseph Stauffer, bull nose, 50; do do yellow globe, 50.
 Charles Lease, pickles, 50.
 Mrs. John Bentz, cranberries, 50.
 Joseph Stauffer, burpies beets, 50.

CLASS 17.—FRUITS.

Apples.

Engle & Sons, best twenty varieties of apples, \$8.
 Jno. B. Kendig, 2d best do 4.
 Daniel Smeych, best ten varieties, 4.
 Samuel Myers, 2d best do 2.
 E. B. Wisler, best Alexander, 1.
 Samuel F. Bahn, Baldwin, 1.
 James A. Stahle, Blush, Baltimore, 1.
 Edwin S. Rutter, Blush, Maiden's, 1.
 Engle & Son, 5 specimens Belle Flour, yellow, 1.

David Zeigler, do Ben Davis, 1.
 Daniel Smeych, do Canada Red, 1.
 W. M. Blaney, do Canada Rennett, 1.
 Emanuel Herman, do Smith's Cider, 1.
 Samuel Myers, do Dommie, 1.
 James A. Stahle, do Famuese, 1.
 Engle & Son, do Fallowater, 1.
 David Ziegler, do Rhode Island Greening, 1.
 Engle & Son, do Gravenstein, 1; do Hubbardstown None Such, 1.
 Milton H. Lauer, do Jonathan, 1.
 W. M. Blaney, do Fall Jenning, 1.
 Samuel F. Bahn, do King of Tompkin Co., 1.
 Engle & Son, do King 1; do Northern Spy, 1; do Newton Pippin, 1;
 do Orange Pippin, 1.
 Edwin S. Rutter, do Porter, 1.
 P. W. Burg, do Red Streak, 1.
 Samuel Myers, do Roxbury Russett, 1.
 James A. Stahle, do Golden Russett, 1.
 Z. Dugan, do Smoke House, 1.
 E. C. Wisler, do Seek-no-Further, 1.
 Samuel Myers, do Monmouth Pippin, 1.
 H. H. McClune, do Sycamore, 1.
 Lewis Kidd, do Wine Sap, 1.
 F. W. Gruver, do Hysop Crab Apples, 1.
 Henry Hoffmyer, do Cole, 1.
 E. B. Wister, do Vandevere Seedling, 1; do Pittsburgh Pippin, 1.
 Samuel F. Bahn, do Winter Rambo, 1.
 P. W. Burg, do Saylor Apple, 1.
 Misses Kaig, do Winter Paradise, 1.
 Mrs. George Throne, do Summer Rambo, 1.
 M. H. Fries, do Lancaster Greening, 1; do Beidler, 1.
 Henry Shetrone, do Early Joy, 1.
 E. B. Wister, do Sweet Seedling, 1.

Pears, Plums, Etc.

Daniel Smeych, best collection of pears, \$5.
 Andrew Watt, dish of pears, 2.
 Daniel Smeych, Buerre Cairgean, 1.
 W. H. Marks, Buerre Diel, 1.
 Daniel Smeych, Buerre D'Anjou, 1.
 E. L. Wiest, Buffam Pears, 1.
 Edwin S. Rutter, Duchese d'Ausouleme, 1.
 W. A. Druck, Flemish Beauty, 1.
 Daniel Smeych, Lawrence, 1; do Sheldon, 1; do Seckle, 1; do Vicar of
 Wakefield, 1.
 Miss Fannie Upp, Urbaniste, 1.

Peaches.

Samuel Myers, Crawford Late, \$2.
 Daniel Smeych, Bilven's Late October, 2; do George the Fourth, 2.
 Adaline A. Greene, Salway, 2.
 Jno. J. Vanderslost, any other variety, 1.
 Edwin S. Rutter, do 1.
 Jno. C. Weiser, plate of figs, 1.
 3 AGR. SOC.

Frank Dehuff, Champion quinces, 1.
 Mrs. W. C. Kraber, Orange or Apple quinces, 1.
 Mrs. Noedel, Pear quinces, 1.
 Mrs. Joseph K. Germon, Rheas Seedling quinces, 1.
 Daniel Smeych, best variety of plums, 5 specimen of each, 3.
 Jno. C. Weiser, plate of persimmons, 1.
 Jno. J. Weakley, plate peaches, no name, 2.
 Henry Shetrone, White Lemon peaches, 2.
 Helena Chapin, Columbia pears, 1.
 Engle & Son, Paragon chestnuts, 1.
 Miss B. Stoner, Seedling, 1.
 James H. Fisher, Yellow Arberge peaches, 2.

Grapes.

Daniel Smeych, best ten varieties of foreign grapes, \$6.
 H. C. Pentz, best collection of native grapes, no less than 20 varieties 8.
 Daniel Smeych, best ten varieties of native grapes, 5.
 George Druck, Agawam, 1.
 H. C. Pentz, Brighton 1; do Bacchus, 1.
 Jno. C. Weiser, Catawba, 1.
 George Druck, Concord 1; do Seedling, 1.
 H. W. Koller, Clinton, 1.
 H. C. Pentz, Delaware, 1; do Duchesse, 1.
 J. T. Brown, Goethe, Rogers, 1, 1.
 Jno. C. Weiser, Iona 1; do Isabella, 1.
 George Druck, Merrimack Rogers 19, 1.
 Jno. C. Weiser, Newburg, 1.
 H. C. Pentz, Niagara 1; do Pecklington, 1.
 Daniel Smeych, Prentiss 1; do Salem, Rogers, 52, 1.
 George Druck, Seusaqua 1; do Telegraph, 1.
 John C. Weiser, Wordon, 1.
 H. C. Pentz, Vergennes, 1.
 Daniel Smeych, heaviest bunch of Niagara, 1.
 H. C. Pentz, do Pocklington 1.
 Samuel Smeych, heaviest bunch of Wilder, 1.
 H. W. Koller, best display of grapes, 3.
 Robert Naylor, Red grapes, 1.
 H. C. Pentz, Rogers 33, 1; do Woodruff Red 1; do Empire State, 1.
 George Druck, Elmira, 1.
 Jno. C. Weiser, Norton Virginia, 1.

CLASS 18.

HAM, CHEESE, CRACKERS, WINE, CIDER CORDIALS, TOBACCO, CIGARS, HATS,
 BOOTS, CLOTHING, ETC.

Lewis Halman, homemade cheese, \$1.
 D. F. Stauffer, homemade grape wine, 1.
 John H. Brooks, do blackberry wine, 1.
 Miss Kate Welsh, do current wine, 1.
 Mrs. Albert Loucks, do blackberry cordial, 5.
 William Hamme, do quince cordial, 50.
 H. J. Baer, cherry wine, 1.
 D. R. Gotwalt, do cider, 50.
 Marcellus P. Diehl, dried peaches, 1
 D. R. Gotwalt, do apples, 50.

Marcellus P. Diehl, do cherries, 50; do pears, 50.
 J. R. Klinedinst, do corn, 50.
 Mrs. B. F. Stauffer, home-cured hams, 1.
 Henry Menges, do dried beef, 1.
 Daniel Nayler, bologna sausage, 1.
 F. S. Dietz, Havana seed tobacco, 5.
 P. W. Burg, Pennsylvania do, 5.
 H. D. Rupp, display of hats and caps, 1st prize, diploma and 4.
 D. H. Welsh, do 2nd prize, 2.
 H. D. Rupp, display of gents' furnishing goods, 1st prize, diploma and 3.
 D. H. Welsh, goods for wearing apparel, do and 4.
 McClellan & Gotwalt, display of groceries, 1st prize, 3.
 D. H. Welsh, made coat, do 2.
 J. A. Gnan, do pants, do 1, do vests, do 1.
 J. C. Channel, cherry bounce, do 50.
 Mrs. A. H. Wellensiek, homemade mince meat, 50.
 Wm. Givens, Wilson Hybrid tobacco, diploma.

CLASS 19.

FINE ARTS.

Flora Bott, best display of oil paintings, \$5.
 Miss Mary S. Forry, oil painting by a native of York county, 4.
 Miss Lucy Glatfelter, painting of flowers in oil, 3.
 Florence M. Elliot, oil painting, other design, 3.
 Miss Helen Denues, display of paintings in water colors, 3.
 G. F. Russet, water color painting, 2.
 P. B. Sprengle, articles of painting on wood, 2.
 Miss E. Peck, painting on silk, 1; do on velvet, 2.
 Miss Clara Frysinger, do on satin, 2.
 Miss Anna B. Purple, do on china or porcelain, 2.
 Walter B. White, do on tin, 2.
 Nellie J. Glatfelter, painted tambourine, 2.
 C. J. Rolland, display of crayon drawing, 3.
 Mrs. C. Neuman, Hanover, Pa., pencil drawings, 2.
 J. M. Bacheldor, pen and ink drawing, 2.
 Horace S. Deininger, display of photographs, dip. and 3.
 W. W. Wogan, display of dentistry, dip. and 3.
 Miss Lucy Glatfelter, oil painting on ebony, 2.
 Watt & Bro., display of paper hangings, 4.
 Miss Mary E. Swartz, painted banner on bolting cloth, 2.
 Miss S. B. Hiestand, article painted on chamois skin, 2.
 Harry P. Weiser, oil painting on plaque, 2.
 Miss S. B. Hiestand, do on tapestry, 2.
 Florence M. Elliot, scrap jars, 2.
 Mrs. John A. Berger, hand painted tidies, 2.
 James R. Wright, engraved chess table top, 2.
 Miss Kate Harvey, painted banner on linen, 2.
 Mrs. S. M. Gable, crayon drawing, 2.
 J. M. Bacheldor, monochromatic painting, 2.
 Walter B. White, display of smoke work, 2.
 Mrs. C. Snyder, painted table scarf, 2.
 Watt & Bro., display of studies of flowers, 2.
 Miss E. Peck, painting on velvet, 1.

CLASS 20.

CARRIAGES, HARNESS AND LEATHER.

- G. W. Strayer, two horse carriage, dip. or \$6; do buggy, dip. or 4.
 Martin Carriage Works, phaeton, dip. or 4; do hunting wagon, dip. or 3.
 G. W. Strayer, one horse sleigh, dip. or 4.
 M. F. Holland, double set carriage harness, dip. or 5; do single do dip. or 4; do riding saddle, 3; do riding bridle, 2.
 Jno. A. Davis, colored sheep skins, 2; do fur skins, 2.
 M. F. Holland, lap blankets, 1; do horse do 1.
 York Carriage Co., buck board wagon, dip. or 2; do wagonette, dip. or 2.
 G. W. Strayer, Dayton, dip. or 2.
 Martin Carriage Works, one man wagon, dip. or 2; do sporting wagon, dip. or 2; do phaeton cart, dip. or 2.
 James Reisinger, bakers' wagon harness, dip. or 2.
 John Wolz, 6 express wagons, dip.
 W. F. Garretson, 6 eclipse steel wagons, dip.
 Alex Spangler, surrey wagon, dip. or 2.
 Phineas Palmer, phaeton, dip. or 2.
 Baugher, Kurtz & Stewart, oak leather backs, 1.
 J. D. Schall, one child's carriage, dip.

CLASS 21.

STOVES.

- H. E. Smith, cook stove for coal, dip. or \$3.
 S. N. Jessop, 2nd best do 2.
 J. A. Walker, best do wood, dip. or 3.
 H. E. Smith, 2nd best do 2.
 S. N. Jessop, stationary range, dip. or 5.
 J. A. Walker, portable, do dip. or 3.
 H. E. Smith, do furnace, dip. or 3.
 Orr, Painter & Co., ornamental parlor stove, dip. or 3; do fire place heater, dip. or 3.
 J. A. Walker, sample of hollow ware, dip. or 3.
 H. E. Smith, variety of iron furniture, dip. or 5; do do tin ware, dip. or 3; do do granite, do dip. or 3; do do gas fixtures, dip. or 3; do do sanitary ware, dip. or 3.
 Central Expanded Metal Co., display of iron fencing and fire proof lath, dip.
 C. F. Bahn, steel roofing, dip.
 A. T. Boekel, display of plumber's work, dip. or 3.

CLASS 22.

CABINETWARE.

- Lewis Shive's Sons, best dressing bureau, hardwood, \$3; do wash stand do, 2; do bedstead, do 2; do sideboard, 3; do display of cabinet-ware, 4.
 N. Goodman, best centre table, 2; do hat rack, 2; do wardrobe, 3; do chamber suit, hardwood, 3; do do soft wood, 3; do dressing bureau, soft wood, 3.
 C. L. Brown, best display of stools, diploma.
 Hess Furniture Company, best parlor suit, 5 pieces, dip; do rug suit, 1; do barrel chair, dip; do rocking chair, 2 or dip; do four brocatelle chairs, 2 or dip; do display of upholstering, 2 or dip; do display of pillows, 1; do folding cots, 1; do folding bed, 1.

CLASS 23.

FARM IMPLEMENTS AND MACHINERY.

- The Wardner, Bushnell & Glessner Co., best reaper with self-raking and automatic binding attachment \$15.
 Eurich & Brooks, 2nd best do 8.
 The Wardner, Bushnell & Glessner Co., best mowing and reaping machine combined 5.
 John Wambaugh, best reaper dip, or 5.
 J. H. Shireman, 2nd best do 3.
 F. S. Dietz, best mower dip. or 5.
 John Wambaugh, 2nd best do 3.
 A. B. Farquhar & Co., best sweep horse power, 6 horses 8.
 H. L. Neuman, 2nd best do 4; do best sweep horse power, 4 horses 5.
 A. Farquhar & Co., 2nd best do 3; do best railway horse power, dip. or 3.
 Heebner & Sons, 2nd best do 2; do best threshing machine, six horse power, with separator and winnower 10.
 A. B. Farquhar & Co., 2nd best do 5.
 Heebner & Sons, best threshing machine, 4 horse power, with separator or winnower, dip. or 2.
 A. B. Farquhar & Co., 2nd best do 3.
 H. L. Neuman, threshing machine diploma; do shaker, dip.
 A. B. Farquhar & Co., portable hay press, dip.
 H. L. Neuman, test corn sheller with shaker for horse or hand power, 3.
 Eurich & Brooks, 2nd best do 1.
 Spangler Manufacturing Company, best corn sheller or horse power, 3.
 A. B. Farquhar & Co., 2nd best do 1.
 Keystone Farm Machine Company, best corn sheller, hand power 2.
 Spangler Manufacturing Company, 2nd best do 1.
 A. B. Farquhar & Co., corn and cob crusher, dip.
 Geiser Manufacturing Company, best portable steam engine for general purposes, 10.
 H. M. Baer, 2nd best do 5.
 Frick Company, best traction engine, dip, and 10.
 Geiser Manufacturing Company, 2 best do 5.
 A. B. Farquhar & Co., portable steam saw mill, dip.
 S. Morgan Smith, best water wheel, 3.
 Baugher, Kurtz & Stewart, 2nd best do 1.
 Jno. F. Thomas & Sons best wind mill, 3.
 H. L. Neuman, cannon corn sheller with cob carrier, dip.
 John Wambaugh, binder truck, dip.
 Eurich & Brooks, corn sheller for hand power with shaker attached, dip.

CLASS 24.

FARMING IMPLEMENTS.

- C. O. Shriener, fanning mill, dip. and \$3.
 Heebner & Sons, best corn stalk cutter, 3.
 G. T. Murray, hay and straw cutter, dip.
 Eurich & Brooks, best grain drill, dip. or 3.
 H. H. Birdsall, 2nd best do, 1.
 Eurich & Brooks, best grain drill with phosphate attachment, dip. or 3.
 A. B. Farquhar Company, 2nd best do, 1.
 John F. Erwin, 2nd best small seed planter, hand power for hills or drills, 1.

C. F. Baum, best broad cast sower for grain, dip. or 3.
L. H. Miller, 2nd best do 1.
Eurich & Brooks, best hay tedder or machine for turning or spreading
hay on the field, dip or 3.
H. H. Birdsall, 2nd best do, 1.
H. L. Miller, best horse hay fork, 2.
H. H. Birdsall, best horse rake, 2.
Jno. F. Erwin 2nd best do 1.
Samuel M. Hoff, best chopping machine, 3.
Heebner & Sons 2nd best do, 1.
A. B. Farquhar Company, 2nd best corn planters, 1.
Spangler Manufacturing Company, best corn planter, with fertilizer
attachments, 2.
L. H. Miller, best hay carrier, reversable, 2.
L. H. Miller, best do, one way, 2.
Heebner & Sons, corn stalk corn cutter, crusher attached, dip.
E. W. Ross & Co., special premium, hay and fodder cutter, hand power, 2

CLASS 25.

FARM IMPLEMENTS.

W. F. Garrison, best farm wagon, \$5.
Acme Wagon Co., 2nd best do 2.
Eurich & Brooks, best 3 horse plow, 3.
Jno. F. Erwin, 2nd best do 1; do best 2 horse plow, 3.
Eurich & Brooks, 2nd best do 1.
Jno. F. Erwin, best riding plow, 3.
E. E. Kent, 2nd best do 1.
Jno. F. Erwin, best wheelbarrow, 1.
The Pitt Agricultural Works, best spring harrows, 2.
Hench & Dromgold, 2nd best do 1.
Spangler Manufacturing Co., best lime spreader, 3.
American Road Machine Co., best road and track scraper, dip. or 5.
Pennock & Sharp, 2nd best do 3.
A. B. Farquhar Co., best potato digger, 2.
Jno. C. Neff, 2nd best do 1.
Hench & Dromgold, best corn cultivator, dip. or 2.
Lewis E. Heidler, 2nd best do 1.
Spangler Manufacturing Co., best roller for general purposes, dip. or 2.
Eurich & Brooks, 2nd best do 1.
Emanuel Daron, best ditching spading machine, 2.
Eurich & Brooks, best manure hook, 1.
Jno. F. Erwin, best combined horse hoe, 2; do best 1 horse plow, 2.
Eurich & Brooks, 2nd best do 1.
Jno. F. Erwin, best exhibit of 14 plows, 3; do best hillside plow, 2.
E. E. Kent, 2nd best do 1.
Eurich & Brooks, best 2 horse cultivator 2; do best stand of steel
shovels for cultivators, etc., 1.

CLASS 26.

FARM AND HOUSEHOLD IMPLEMENTS.

Jno. F. Thomas & Sons, best lift and force pumps for deep wells, \$3.
L. L. Ullrich, 2nd best do 1; do best common iron pumps, 2.
L. H. Miller, 2nd best do 1.

Jno. F. Thomas & Sons, best wood pumps, 2.
 A. B. Farquhar Co., best portable cider mill and press, dip. or 3; do best shingle cutter, 1.
 M. W. Lau, best churn, 1.
 Vermont Farm Machine Co., butter worker 1; do milk strainer, 1.
 C. Mears, washing machine, 1.
 Paul Mosebaugh, lot wire tied brooms, 1.
 Jno. Wambaugh, sausage meat chopper, 1.
 C. Mears, clothes wringer, 1.
 F. M. Schleeter, display of potter's ware, 1.
 M. E. Hartzler, clothes horse, 1.
 W. H. Wiest, display of baskets, 1.
 Jno. F. Erwin, bag truck, 1.
 Alfred Shepp, ironing table, 1.
 Jno. F. Erwin, set garden implements 1; do lawn mower, 1.
 Lewis Strayer, milk and cream separator 1; do fruit and vegetable squeezer, 1.
 Evans & Heuling, milk cooler, 1.

CLASS 27.

MISCELLANEOUS IMPLEMENTS AND NEW INVENTIONS.

S. Morgan Smith, best machine line shafting, dip.
 L. W. Shaffer, best machine for sharpening knives of mowers and reapers, \$2.
 Spangler Manufacturing Co., best broad cast fertilizer distributor, dip.; do best fertilizer sower, single row, dip.
 Hench & Dromgold, best corn planter and cultivator combined, double row, 5.
 S. Morgan Smith, best gearing for transmitting power, dip.
 W. W. Smith, best tobacco scrap machine for power 3; do 2nd best do for hand, 1.
 J. C. Schmidt, 2d best display of iron chains, 1.
 John F. Erwin, best tobacco planter, 3.
 Vermont Farm Machine Co., best creamer, 2.
 M. W. Lau, 2nd best do 1.
 Vermont Farm Machine Co., best butter printer, dip.
 M. W. Lau, best box for shipping butter, dip.; do best cream shipping can, dip.
 Vermont Farm Machine Co., best cream can, dip.
 Erb, Markel & Co., best fifth wheel for buggy, dip.
 E. E. Kent, best reversible flat land plow, 3.
 Dr. C. U. Hoke, best electric appliances, dip.
 C. Mears, 2nd best railway dog power, 1.
 Jacob C. King, best automatic grain scale, dip.
 Geo. M. Mundorf, 2nd best farm and wagon chain, hand made, 1.
 Western Engine Co., 2nd best wire stretcher, 1.
 Quickel & Graybill, best electrical exhibit, dip.; do best steam engine $\frac{1}{2}$ horse power, dip.
 W. H. McCurdy, best animal releasing device, dip.
 J. A. Augenbaugh, best brooder, 2.
 Vermont Farm Machine Co., best surface skimmer, dip.
 Bromell, Schmidt & Co., best steam heating boiler, dip.; do best hot water radiators, dip.; do best combined kitchen range and hot water heater, 5.

W. H. Kulp, Chicago, Ill., best wire fence, dip.
 Frick Co., best water wagon for traction engine, dip.

CLASS 28.

CARPETS AND WOOLEN GOODS.

Samuel Hively, best 15 yards wool carpet \$2.
 Jacob S. Kendig, best 15 yards rag carpet 2.
 W. H. M. Marks, best 15 yards wool and flax 1.
 Mrs. Maria Wills, best double coverlet 1.
 Mrs. Jane Smyser, best single do 1.
 Samuel Hivoly, best 10 yards home-made linen 2; do best 10 yards do table linen 2.
 W. H. Marks, best linen table cloth 1.
 Miss Alice Hantz, best linen napkins 1.
 Samuel Hively, best 10 yards linen diaper 2.
 Ellen Harlacher, best lb. home-made thread 1.
 Mrs. J. H. Rose, best pair home-made woolen blankets 2.
 P. H. Sprengle, best home-made hearth rug 1.
 Mrs. H. C. Day, best door rug 1.
 P. H. Sprengle, best carpet rag rug 1.
 L. W. Shaffer, best home-made hard soap 1.
 Mrs. R. Kitchen, best 2 lbs. home-made woolen yarn 1.
 Henry Sleeper, do soft do 1.
 Mrs. Sarah Heindle, best home-made linen towels 1.
 John Hamme, best woolen spread 1.
 Miss Alice Hantz, best home-made linen tray cover 1.
 Anna J. Laucks, best lb. flax 1.
 P. H. Sprengle, best home-made linen sheets 1.
 J. H. Rorbaugh, do linen towels 1.
 Samuel Hively, do tow linen 1; do linen bags 1.
 D. S. Coble, do linen feather bed case 1.
 Mrs. J. W. Stewart, best home-spun scarf 1.
 Theodore H. Gehly, best 2 rolls rag carpet 2; do 5 rolls yarn do 2.

CLASS 29.

CROCHETED WORK, KNITTED WORK, NETTING.

Anna Reiker, display of crocheted work greatest variety of designs \$3.
 Miss Clara Ammon, crocheted cape 1.
 Mrs. C. A. Klinefelter, do skirt 1.
 Samuel S. Long, do nubia 1.
 S. Slaymaker, do hood 1; do do mittens 1.
 Mrs. S. N. Hench, do sacque 1.
 Edward S. Schatzberger, do tidy 1.
 Mrs. R. Kitchen, fancy knitted silk stockings 1.
 S. Slaymaker, do silk socks 1.
 Miss Kate Peters, do woolen socks 50c.
 Miss Jennie Shaffer, do stockings 50.
 Mrs. R. Kitchen, do silk mittens 50.
 Miss Kate Peters, fancy knitted wool mittens 50.
 Mrs. John Bentz, display knitted articles for infants wear \$1.
 Mrs. A. W. Woodward, crocheted purse 1.
 Spangler Welso, display, do lace 1.
 Miss B. Stoner, piece do 50c.

Mrs. M. E. Fastnacht, display crocheted lace in zephyr or Saxony 1.
 M. Huse, crocheted tidies 1.
 Michael D. Barnitz, piece do lace in zephyr or Saxony 50c.
 S. Slaymaker, do child's afghan 2.
 Miss Lottie Glesbrenner, knitted do 2.
 Miss L. C. Beeler, crocheted or knitted sofa cushion 1.
 Mrs. A. W. Woodward, child's knitted skirt 1.
 Mrs. R. Kitchen, display knitted lace 1.
 Holder of ticket No. 485, article rack 50.
 Mrs. M. E. Fastnacht, feather edge lace 1.
 Mrs. R. Kitchen, fancy silk collars 1.
 Ella E. Fahs, silk crocheted scarf 50.
 H. J. Baer, ladies' knitted skirt 1.
 Miss M. G. Wiest, crocheted chemise yoke 1.
 Mrs. Patrick Welsh, do mats 1.
 Miss Anna Harsler, do cake cover 1.
 Mrs. R. H. Buttorff, pr knitted slippers 1.
 Jennie Straeffler, article knitted lace 1.
 S. Slaymaker, do cape 1.
 Miss Kate Schall, child's do sacque 1.
 Florence M. Elliott, crocheted center piece for table 1.
 Mrs. A. H. Wellensick, do lamp shade in silk 1.
 M. H. Hartzler, do cake tidies 1.
 Mrs. E. H. Hantz, do slippers 1.
 Anna K. Hays, knitted sacque 1.
 J. L. Menough, feather edge tidy 1.

CLASS 30.

SILK EMBROIDERY, CREWEL EMBROIDERY AND ORNAMENTAL NEEDLEWORK

Wm. H. Gable, silk embroidery 3 pieces \$5.
 Miss S. E. Heller, silk embroidery on satin 2.
 C. L. Sutton, silk embroidery on linen 2.
 Gates B. Weiser silk embroidery on flannel 2.
 Miss M. G. Wiest, silk embroidery on canvas 2.
 Mrs. A. W. Woodward, silk embroidery on madras or bolting cloth 2.
 S. Slaymaker, embroidery foot rest 2.
 Mrs. B. S. Romer (Bellair, Md.), silk embroidered sofa pillow 2.
 Miss Mary E. Swartz, article embroidery on plush 2.
 Mrs. J. H. Rose, do oriental embroidery 2.
 Mrs. S. N. Hench, do tinsel embroidery 2.
 M. W. Strickler, embroidered valance 3.
 Miss Mary E. Swartz, do towels 2.
 Mrs. A. W. Woodward, outline embroidery 3 pieces 2.
 H. J. Baer, display outlined embroidery filoselle 2.
 Mrs. F. A. Ashbrook, fancy table cover 2.
 Rutter Herman, do scarf 2.
 Miss Mary E. Swartz, fancy bracket lambrequin 2.
 Charles Overdick, article crewel embroidery 2.
 Michael D. Barnitz, embroidered lamp mat 1.
 Holder of ticket No. 822, do tidy 1.
 Miss Cordia Kable, silk shopping bag 2.
 Andrew Watt, silk embroidered dogolies 1.
 Miss Mary E. Swartz, do slippers 1.
 C. L. Sutton, satin pin cushion 1.

Miss S. D. Hiestand, display of embroidered bags 2.

Miss E. Kate Bender, satin sofa pillow 1.

CLASS 31.

IMPORTED LACES, FANCY MISCELLANEOUS WORK.

C. E. Miller, display of Honiton lace, \$1,

R. H. Buttorff, display of point lace, 1.

Miss Jane Smyser, lace tidy, 1.

Frances S. Trumbo, article bead work, 50c.

Miss S. B. Hiestand, display of feather work, 1.

Mrs. Hugh Bay, display of dried ferns and leaves, 1.50.

Mrs. A. W. Woodward, wall pocket, 1; do shaving case, 1; do work basket, 1; do shoe pocket, 1.

Florence M. Elliott, work bag, 1.

Mrs. R. Kitchen, lace handkerchief, 1.

W. H. Marks, homemade fancy fan, 50c.; do paper design, 50c

S. N. Hench, lace collar, 1.

Miss Carrie Wampler, handkerchief sachet, 50c.

Frank H. Bierman, plush handkerchief case, 1; do, photograph case, 50c.

Miss S. D. Heistand, display of glass boxes, 1.

Miss Lizzie Harsler, plush chair pillow, 1.

Miss Helen Dennis, glove case, 50c.

Jno. A. Fisher, paper flowers, 50c.

Mrs. E. H. Hantz, sofa cushion, 1.

Miss E. Kate Bender, article dutchesse lace, 1.

Miss Emma Strack, article Honiton lace, 1.

A. H. Wellensick, imported silk stockings, 1.

Miss Ella E. Fahs, shopping bag, 1.

C. L. Sutton, lace sofa cushion, 1.

Miss Carrie Wampler, match receiver, 50c.

CLASS 32.

ZEPHYR WORK, BED QUILTS, OF ANY MATERIAL.

William Hamme, sofa afghan work, \$3.

M. E. Mowbray, article plain zephyr wool, 1.

Miss Mary E. Swartz, do tufted do, 1.

Mrs. A. W. Woodward, sofa cushion on canvas, 1.

Mrs. E. E. Shearer, silk patchwork bed quilt, 3.

Anna I. Lauck, crazy do, 4.

William Koch, fancy sofa cover, 3.

Mrs. John A. Burger, do bed cover, 5.

Mrs. B. F. Stauffer, woolen bed quilt, 1.

Samuel Shaffer, cotton do, 1.

C. B. Kauffman, worsted rug, 3.

Miss Mary Ramsay, pillow sham (not embroidery), 1.

Mrs. John A. Burger, portiere do, 5.

M. E. Mowbray, worsted embroidery picture, 1.

Miss Alice Hantz, linen pillow cases, 1.

CLASS 33.

COTTON EMBROIDERY, BRAIDED WORK, DRAW WORK.

Mrs. H. C. Day, article of plain needle work, 50c.

Miss Kate Schall, fancy apron, \$1.

S. Slaymaker, display of button holes, 1.
 Mrs. H. C. Day, article of darning, 1.
 Florence M. Elliott, fancy darning on net, 1.
 Miss Alice Hantz, article cotton embroidery, 1.
 Mrs. B. S. Romer, sample drawn work, 1.
 Miss Katie A. Wellensick, sample hemstitching, 1.
 Mrs. W. F. Elliott, display outline embroidery, 2.
 Miss Mary E. Swartz, article outline embroidery, 1.
 V. H. McCurdy, article applique work, 1.
 Miss Katie A. Wellensick, display of drawn work, 3.
 Harry Grey, article drawn work, 3.
 Mrs. E. A. Boeckel, outline bureau stand cover, 1.
 Miss Hellen Dennis, drawn work sheet, 1; do bureau cover, 1; do handkerchief, 50c.; do pair tray covers, 1.
 Wm. Cronewert, embroidered handkerchief, 50c.
 Mrs. C. A. Klinefelter, buffet scarf drawn work, 1.
 Miss Anna B. Purple, drawn work doilies, 50.
 Mrs. Samuel Sipe, case of fine shirts homemade, 1.
 E. A. Sultner, linen doily, 50c.
 Mrs. J. M. Quigley, embroidered cotton handkerchief, 50c.

CLASS 34.

CAKES, BREAD, ETC.

Peter Kunkle, homemade bread, \$1.
 Fox & Bro., baker's bread, 1.
 C. E. Hantz, orange cake, 1.
 Mrs. C. Snyder, ice cream do 1.
 Grace Heiges, chocolate do 1.
 C. E. Hantz, sponge do 1.
 Mrs. J. J. Nandershoot, fruit do 1.
 Mrs. C. Snyder, gold do 1; do silver do 1.
 Mrs. E. A. Boeckel, sugar do 1.
 C. E. Hantz, white mountain do 1.
 Miss Anna Hassler, custard do 1.
 Miss Lou Anstadt, marble do 1.
 L. W. Shaffer, taylor do 1.
 C. E. Hantz, corn starch do 1.
 Mrs. C. Snyder, other fancy cakes, 1.
 William H. Taylor, crullers, 1.
 Miss S. B. Heistand, cream puffs, 1.
 Mrs. W. H. Welsh, jumbles, 1.
 Anna Schall, biscuits, 1.
 L. W. Shaffer, rusks, 1.
 L. D. Harnish, display of confectionery, 2.
 Lewis Halman, 2 lbs. butter, 1st premium, 2.
 Frank Hoffheins, do 2nd premium, 1.
 E. H. Miller, 5 lbs. honey, 1st prem. 2.
 David Myers, delicate cake, 1.
 J. F. Rohrbaugh, spice do 1.
 Mrs. E. A. Boeckel, buckeye do 1.
 Mrs. W. H. Welsh, sand tarts, 1.
 Mrs. S. N. Hench, hickory nut loaf cake, 1.
 Mrs. W. H. Welsh, quince honey, 1.
 Anna E. Welsh, 6 varieties of kisses, 1.

Mrs. W. H. Welch, 5 varieties of candies, 1
 Miss Fannie Upp, lemon custard, 1.
 Adaline G. Fallon, gold leaf do 1.
 Mrs. F. E. Evans, angel do 1.
 J. L. Kable, cinnamon do 1.
 Miss Alice Maul, potatoe pie, 1.
 Anna Schall, cocoanut cakes, 1.
 Mrs. Curtis Saunders, peach honey, 1.
 Alex. Spangler, dutch nut cake, 1.
 Miss M. G. Wiest, chocolate cream do 1.
 Miss Anna Menges, snow ball do 1.
 Mrs. Elizabeth Herr, ginger crackers, 1.
 A. F. Gallatin, boned chicken, 1.
 Harrison M. Heidler, almond candy, 1.
 Henry Sleeper, ginger cakes, 1.
 D. S. Coble, Lady Claire cake, 1.
 Miss Lou Anstadt, conserved peaches, 1.
 P. B. Sprenkle, fig cake, 1; do Rochester do 1
 Mrs. Albert Loucks, strawberry do 1.
 Miss Clara Ammon, white fruit do 1.

CLASS 35—DIVISION A.

Preserves.

Miss Laura Ebert, best strawberries, \$1.
 Jno. W. Free, best quinces, 1.
 Mrs. W. H. Welsh, best plums, 1.
 Miss E. Kate Bender, best peaches, 1.
 H. L. Neuman, best pears, 1.
 L. Lefever, tomatoes, 1.
 D. S. Coble, best cherries, 1.
 M. L. Weigle, best raspberries, 1.
 M. E. Mowbray, best conserved squash, 1.
 Mrs. Curtis Saunders, best pine apple jam, 1.
 Chas. F. Baer, best conserved pine apple, 1.

DIVISION B.

Mrs. W. H. Welsh, best canned tomatoes, \$1; do best blackberries, 1.
 Mrs. Curtis Saunders, best peaches, 1.
 W. H. Marks, best pears, 1.
 Charles Anstadt, best quinces, 1.
 Mrs. John Hamilton Small, best pine apple, 1.
 J. R. Clinedinst, best cherries, 1.
 Mrs. W. H. Welsh, best strawberries, 1; do best plums, 1.
 Mrs. E. H. Hantz, best corn, 1; do best peas, 1; do best Lima beans, 1.
 Mrs. S. N. Hench, best apricots, 1.
 Mrs. S. E. Fastnacht, best huckleberries, 1.
 V. H. McCardy, best rhubarb, 1.
 Mrs. J. Sprenkle, best crab apples, 1.

CLASS 36.

JELLIES.

Robert Naylor, best currant jelly, \$1.
 Mrs. Chas. S. Billmeyer, best quince, 1.
 Miss Mary S. Forry, best raspberry, 1.

Clarence Welsh, best blackberry, 1.
 Mrs. J. Rebert, best apple, 1.
 Mrs. M. D. Rupp, best plum, 1.
 J. D. Harnish, best grape, 1.
 Mrs. H. C. Day, best crab apple, 1.
 John Eisenhart, best elderberry, 1.
 Samuel Myers, best apricot, 1.
 Mrs. Albert Loucks, best orange, 1.
 Emanuel Holl, best lemon, 1.
 Mrs. Hugh Bay, best gooseberry, 1.
 Mrs. J. H. Baer, best rhubarb, 1.
 Mrs. Curtis Sanders, best fox grape, 1.
 H. J. Baer, best citron, 1.
 Mrs. W. H. Welsh, best strawberry, 1.
 William H. Taylor, best peach, 1.
 J. D. Brown, best pear, 1.
 Emanuel Holl, best tomato, 1.
 Mrs. H. W. M. Call, best apple and grape, 1.
 Marcellus P. Diehl, best cranberry, 1.
 Robert Naylor, best sarvesberry, 1.
 Mrs. Minnie Schriver, best water melon, 1.
 J. C. Fallon, best peach marmalade, 1; do best apple do 1.
 H. H. McClune, best pine apple do 1.
 Marcellus P. Diehl, best orange do 1.
 John H. Brooks, best quince do 1.
 Mrs. Hugh Bay, best citron do 1.
 Mrs. W. H. Welsh, best tomato do 1.
 W. H. Worns, best plum do 1.
 Mrs. Geo. Throne, best cherry do 1.
 Andrew Watt, best pear do 1.
 Peter Kunkle, best canteloupe do 1.
 Mrs. Albert Loucks, best dewberry do 1.
 Dr. H. A. Hay, best peach sauce, 1.
 Mrs. E. A. Boeckel, best peach butter, 1.
 J. Krout, best pear butter, 1.

CLASS 37.

PICKELS.

Dr. J. B. Kain, applebutter, \$1.
 Mrs. David G. Foose, peaches do 1.
 Mrs. M. H. Wiester, pears, do 1.
 Mrs. W. C. Kraber, quince do 1.
 J. C. Fallon, green plum, 1.
 Miss Mary Smyser, pickled cucumbers, 1.
 Peper Kunkel, peppers do, 1.
 Dr. H. A. Hay, do tomatoes, 1.
 C. E. Hantz, do canteloupes, 1.
 Gabel Marks, do peaches, 1.
 H. L. Neuman, do plums, 1.
 D. S. Coble, do quinces, 1.
 Albert Smyser, of D., do pears, 1.
 M. L. Weigel, do cherries, 1.
 Mrs. W. H. Welsh, do onions, 1.
 Mrs. Hugh Bay, do mangoes, 1.

Mrs. E. H. Hantz, do cauliflower, 1.
 John A. Davis, do chow chow, 1.
 Miss Mary Smyser, do cabbage, 1.
 Peter Lunkel, mixed pickles, 1.
 H. H. McClune, tomato catsup, 1.
 Miss Mary Smyser, pickled, 1.
 D. A. Stouch, cider vinegar, 1.
 J. C. Fallon, grape butter, 1.
 Charles Anstadt, spiced watermelon, 1.
 Miss M. Schriver, pickled bananas, 9.
 C. Overdick, do celery, 1.
 R. Naylor, do mulberries, 1; do honey vinegar, 1.
 Gable Marks, brandied peaches, 1.
 Mrs. Eliza Herr, mustard pickle, 1.
 Adam Yessley, Chili sauce, 1.
 Mrs. W. H. Welsh, burr pickles, 1.
 Miss Mary S. Forry, pickled martinoes, 1.
 Mrs. Richard Watt, spiced pears, 1.
 Samuel Myers, pickled sugar peas, 1.
 N. H. McCurdy, pepper slaw, 1.
 Charles Anstadt, cold catsup, 1.
 H. L. Neuman, plum butter, 1; do pineapple do 1; do pickled grapes, 1.
 Mrs. Hugh Bay, rhubarb butter, 1.
 Mrs. David G. Foose, spice grapes 1; do do beans, 1.
 William Cronewert, cherry butter, 1.
 Andrew Watt, spiced damsons, 1.
 J. R. Klinedinst, do apricots, 1.
 Dr. Jacob Hay, do plums, 1.
 Lella T. Welsh, brandied gooseberries, 1.
 Mrs. Hugh Bay, raspberry butter, 1.
 E. A. Sultner, spiced peaches, 1.
 H. C. Greenewalt, do 1.
 J. H. Gardner, do quinces, 1.
 P. H. Sprengel, blackberry vinegar, 1.
 Mrs. Hugh Bay, spiced ground cherry, 1.
 Mrs. Albert Loucks, pickled okra, 1; do watermelon butter, 1; do canteloupe butter, 1.

CLASS 38.

FLOWERS.

C. R. Hartman, best collection of green house plants, \$5.
 Mrs. Geo. P. Zeigler, 2nd best, do 3.
 William A. Weister, best greatest variety of dahlias, 2.
 Bernard Brueggman, 2nd best do rose, 2.
 C. R. Hartman, best do roses, 2.
 Samuel Smyser, 2nd best do 1.
 C. R. Hartman, do verbenas, 1.
 John C. Weiser, collection of geranium astors, 1.
 Bernard Brueggman, floral ornaments, 1.
 C. R. Hartman, hand bouquet, 2.
 M. L. Weigle, most beautifully arranged basket of flowers, 1.
 C. R. Hartman, variety of fuchias, 1; do geraniums, 1.
 John C. Weiser, glexius, 1.
 William H. Weiser, phlox, 1.

Mrs. E. E. H. Hantz, gladiolas, 1.
 Mrs. George P. Zeigler, begonia, 1.
 John C. Weiser, zinnias, 1; do celosin (coxcomb), 1.
 John Wolf, castor oil plant 1.
 Albert Smyser (of D), lemon tree, 1.
 William H. Weiser, fig tree, 1.
 Mrs. George P. Zeigler, hanging basket with growing plant, 1.
 Daniel Shellenberger, variety of cactus, 1.
 William Loose, variety of coleus, 1.
 J. H. Shireman, cotton plant, 1.
 Callie Fisher, growing ferns, 1.
 John C. Weiser, collection of double pearl tube roses, 1.
 D. F. Stauffer, growing palm, 1.
 Joseph U. Test, collection of grape vines for planting, 1.

CLASS 39.

MISCELLANEOUS ARTICLES.

Rev. C. F. Braesch, display of barks, \$1.
 M. Alexander Gates, collection of birds (prepared), dip. or 2; do do animals, 2.
 Casper Loucks, collection in conchology, dip. or 2; do do mineralogy, dip. or 2; do do of fossils, dip. or 2; do do Indian relics, dip. or 2.
 John H. Small & Bro., display of druggists' samples, dip. or 2.
 E. A. Snyderman, do rustic work, dip. or 2.
 Charles H. Dempwolf, do phosphate of lime, dip. or 2.
 G. W. Bollinger, do ground bone, dip. or 2.
 Charles H. Dempwolf, phosphate crusher, dip. or 2; do dissolved bone, 2.
 Eurich & Brooks, collection of fertilizer materials, 2.
 Charles H. Dempwolf, sample of poultry supplies, 2.
 York Safe and Lock Co., safes, dip.
 A. C. Strack, spinning wheel chair, 1.
 Stephen Boyd, advertising cards, 1.
 Acme Oil Co., lubricating and illuminating oils, dip.
 J. A. Shoemaker, scroll-work clock, 1.
 Mrs. Patrick Welsh, woolen yarn wrapper, 50c.
 York Ice and Refrigerator Co., block of manufactured ice, 1.
 Dr. N. H. Shearer, flavoring extracts, 2.
 John B. Wantz, Bible, 1.
 D. E. Frey & Co., Hamline paints, dip.
 Samuel Engle, 5 swings, 1.
 John Wolf, coal screen, 50c.
 Clem Heiver, one violin, 50.
 C. G. Bailey, display of starch polish, dip.
 Harrison M. Heidler, display of Stafford's corsets, dip.
 Harry Grey, tooth and backbone of buffalo, 50; do scarf pin and magic garters, 50.
 Miss E. Kate Laucks, buffalo horns, 50.
 Andrew Watt, silk muffler from Japan, 50; do sofa cushion entered by a sailor, 50; do child's do 50.
 Mrs. Christian Otto, hand-made beaded vest, 50; do do scarf, 50.
 John J. Englert, one play house, 1.
 N. B. Sowers, display of war relics, 1.
 D. B. Doyle, display of marble, dip.

George Miller, display of stuffed chickens, 1.

J. H. Gardner, glass lantern, 50.

Mrs. Elizabeth Herr, pink quilted satin skirt, 1.

Mrs. H. Voght, ivory ink stand, 50; do ivory carving, 50; do scroll sawing, 50.

Miss Alice Hantz, silk cocoons, 50.

John C. Weiser, fruit and ornamental trees, dip.; do bearing apple tree, 1.

R. W. Buckingham, one chair, 50.

George B. Pfaltzgrass, display of pottery, 1.

Watt & Bros., artist's materials, paints, etc., dip. or 2; do display of brushes, 1.

J. U. Test, carpet stretcher, dip.

Hecker Buckwheat Co., Hecker's flour, buckwheat, oat meal and farina, dip.

Theodore H. Gehley, gold medal sweepers, dip.; do display of carpets and rugs, dip. or 5.

York Hair Restorer Co., display of hair restorer, dip.

Catharine Schroeder, 1 pair vases and 1 vase, 1.

REPORT

OF THE

Pennsylvania State Dairymen's Association,

1890.

LIST OF OFFICERS.

President.

Dr. T. L. FLOOD, Meadville, Pa.

Executive Committee.

Hon. J. C. SIBLEY, 1st Vice President, Franklin, Pa.

J. B. PHELPS, 2d Vice President, Conneautville, Pa.

JOHN C. MCCLINTOCK, 3d Vice President, Meadville, Pa.

Secretary.

GEO. H. ST. JOHN, Meadville, Pa.

Treasurer,

W. W. DEAN, Meadville, Pa.

Vice Presidents.

Charles Lott.	Warren county.
William Marsh,	Erie county.
R. L. Cochran,	Venango county.
H. F. James,	Venango county.
T. J. Forker,	Mercer county.
F. G. Mellanger,	Lancaster county.
Thomas Magee,	Centre county.
William Darlington,	Chester county.
R. S. Cauldwell,	Washington county.
Eastburn Reeder,	Bucks county.
Joseph Gillingham,	Montgomery county.
Leonard Rhone,	Centre county.
S. M. Shields,	Jefferson county.
Henry Phelps,	Allegheny county.
J. S. Lavery,	Erie county.
E. E. Critchfield,	Westmoreland county.

SIXTEENTH ANNUAL MEETING

OF THE

Pennsylvania State Dairymen's Association,

Held at Library Hall, Meadville, Pa., February 25, 26 and 27, 1890.

The meeting was called to order at 3:00 P. M., President J. C. Sibley in the chair.

The large attendance of members present indicated the interest taken in the meeting from the start. Organization was effected by the appointment of the following committees:

Committee on Resolutions.—L. A. Tucker, Drake's Mills, Pa.; R. L. Cochran, Franklin, Pa. and D. M. Bole, Venango borough, Pa.

Committee on Audit of Accounts.—E. W. Shippen, Meadville, Pa.; Charles Lott, Lottsville, Pa., and John S. Kean, Evansburg, Pa.

Committee on Finance and Membership.—John Howard, R. L. Shaw and T. M. McKinney.

Intelligence Committee.—J. B. Phelps, W. W. Dean and G. H. St. John.

Committee on Utensils.—S. N. Chase and F. W. Edmunds.

The report of the secretary was read as follows:

SECRETARY'S REPORT

Mr. President, and Members of The State Dairymen's Association:

In accordance with your instructions of last year, I addressed a letter to one of our representatives on the subject of an increase in our annual appropriation. He replied that the present appropriation is simply for the report of proceedings, and for no other purpose. Further, that an increase on that ground was unreasonable; and that an attempt on any other basis would be an infringement on the provisions of the constitution of the state. I have lately referred this subject to the Auditor General, and he informs me that we receive our appropriation by an act of assembly, and intimates that, by proper measures, with the consent of the general assembly, an increase could be obtained. In my opinion, the value of our annual report would be greatly enhanced by publication in some form as soon as possible after the annual meeting. I think this could be accomplished by proper effort on the part of the association, and I recommend that renewed effort be made to have the report placed in the hands of farmers and dairymen within thirty days of the close of the annual meeting. The amount, if properly placed, required to print and circulate five thousand copies would not exceed \$250.

The condition of the dairy interest is not flattering. It is evidently in such a state as is not calculated to stimulate enterprise in the direction of costly improvements in dairy stock or implements.

The industry is in full sympathy with the general business depression which rests upon every department of agriculture.

Yet, in spite of this, advancement is being made in the methods of feeding and breeding, and better results are correspondingly obtained. The future is not roseate, but it affords some promise of prosperity.

The discussion of the silo at last year's meeting has induced a goodly number of our farmers to test this method of preserving food for animals. Complete success has not been attained in every instance, but enough progress has been made to demonstrate the economy of the silo. The committee has aimed in the arrangement of the programme, this year, to give this subject full discussion.

Since our last meeting, the butter extractor has been introduced, and present indications point to a revolution in the process of butter making. We made a strenuous effort to secure one of the machines for exhibition here; but, though our efforts were a failure this year, yet we are assured that next year we shall have a chance to see it thoroughly tested.

The agricultural reports of last year are partially distributed, while all members who have not been supplied can be accommodated at this meeting. Though the matter it contains is nearly two years old, yet the contents are of great value to every farmer. Last year's report will be ready in June, when any member can obtain a copy by calling at the office of the secretary. The number of new members received last year was forty-one. The banquet tendered by President Sibley, aside from furnishing an excellent opportunity for members to become acquainted, gave evidence of the fact that a feast of reason and a flow of soul is keenly relished by our yeomanry. For a detailed statement of the receipts and expenditures of the year, we refer you to the treasurer's report.

Report of treasurer received as follows, and referred to the auditing committee:

TREASURER'S REPORT.

MEADVILLE, PA., February 24, 1890.

W. W. DEAN, *Treasurer, in account with the Pennsylvania State Dairymen's Association:*

DR.

To balance in treasury	\$183.77
state appropriation	350.00
cash from membership	41.00
Total	\$574.77

CR.

By sundry bills, as per vouchers,	\$266.40
sundry bills as per vouchers after February 8,	150.08
Total,	\$416.48
Balance on hand February 24, 1890,	\$158.29

W. W. DEAN.

PRESIDENT SIBLEY'S ADDRESS.

Gentlemen of the State Dairymen's Association :

According to the programme which I have before me, it is now in order for the president's address.

I want to say frankly that I have not prepared an address for this occasion, and had determined to say nothing but to thank you, one and all, for your kindness to me in the past while acting as your presiding officer.

Having fully determined, under no circumstances to be a candidate for or to accept the position of president of this association for another term, and being equally positive that I am not, nor will be, a candidate for any political position, it seems that some words that I feel impelled to say cannot be charged to politics or place seeking. Nor if continuing in the position, would I desire to lay your association open to the charge of being controlled by partisans, or dominated by a spirit of political intrigue. Nor is it my desire to engender in your breasts any feeling of malice against those honorable gentlemen, who, at certain stated seasons of the year, beleaguer your domicils, and so affably, yet persistently, demonstrate their fondness for and devotion to your interests, and who, immediately upon the close of the campaign, forget that their political success was due directly to your efforts.

The condition of the agricultural classes seems to call for some attention, and I cannot look upon the future prospects of the farmer or dairyman as being either flattering or encouraging.

I believe, as firmly as I believe in my existence, that the condition of those engaged in agricultural pursuits will be more and more deplorable as the years go on.

We, as an association, exist here to-day, not by our own right, but by political favor; and the report read by your secretary shows how narrow is the margin by which we do or may continue our existence.

While not wishing to be considered an alarmist, my belief is that, except by wise legislation, to be secured only by the most thorough and complete organization of all interested in agricultural pursuits, the farmer of the United State will come to occupy a position similar to that of the tenant farmers of England and Ireland. Year by year you have seen the encroachment of other branches of business upon that of agriculture. You, who comprise forty-four per cent. of the population of the United States, do not exert an influence on legislation equal to five per cent. of those engaged in other callings in life. In every section of the country you see active and hard workers closing up the ranks of the toilers even to the extent of political work. Commerce is organized, manufacturers are organized, railroad men are organized, doctors, lawyers, merchants, priests and wage workers are organized in every department of labor. Each has its guild, and the wants of these various callings are presented by a firm and unbroken front of earnest men who speak as one man in making their demands for recognition of rights, or supposed rights of their respective classes. United effort and thorough organization seem imperatively necessary to sustain the cause you represent, and yet, as farmers, we must needs be such blind partisans as to act as foolishly as we would if, when hunting, we should shut our eyes and shoot our gun into the air in hopes of bringing down game for a Sunday dinner. I do not know how it is

here, but you can go through Venango county to-day and find farming lands cheaper than in 1870. My judgment is, except some who are following specialties, farmers are as a class poorer than they were then. Twenty years of harder work and longer hours than are required in most other callings, deprivation of many of the enjoyments of the town, rigid economy, temperate habits and unremitting toil bring their recompense, and what? The farm of less value, the mortgage larger, the prices of all your products lower! Do I paint the picture too dark? Go into the New England states and see conditions there. Within sound of the State House bell of the capital city of New Hampshire are scores of farms where the once fertile meadows and fruitful fields are grown up with underbrush and are as desolate as when the red man trod their trackless wilds. You will see houses spring out of the brush reaching to their very eaves. Houses that are as fine, and barns better than the majority of Pennsylvania farmers own to-day, deserted and desolate. The owners forced to leave the farms for something that better requites the labor of the toilers. According to the report of the Auditor General of that state, eight hundred and seventy-eight farms, with good houses and barns, have been completely deserted in the last ten years. Generations ago the poet Goldsmith sounded the alarm in England when he wrote—

"Ill fares the land to hastening ills a prey,
When wealth accumulates and men decay.
Princes and Nobles may flourish, or may fade;
A breath can make them as a breath has made,
But a bold peasantry, their country's pride,
When once destroyed can never be supplied."

And again in the same poem—

"Ye men of truth, statesmen who survey
The rich man's joys increase, the poor's decay,
'Tis yours to judge how wide the limits stand
Between a splendid, and a happy land."

Must my statements still seem strange and alarming? Yet the condition of the farmers of New England is slowly but none the less surely moving westward, and will soon be yours. To my personal knowledge, good dairy farms in New York State, that would have commanded seventy-five dollars per acre in 1875, would now go hunting buyers at forty dollars per acre. Having recently returned from California, let me tell you something of their farming. In harvest seasons you may see engines propelling harvesters through the wheat fields, cutting a swath twenty-six feet wide, threshing the grain as it goes along, putting it into bags and dropping five bags in each pile—so cutting, threshing, and putting the grain into sacks, and all at a cost of only seventy-five cents, or less per acre. With their twenty thousand or forty thousand acre tracts and with such vast accumulation of resources in competition, I cannot view your future here as agriculturists with hopefulness. Education and organization must be our watchwords. As dairymen we have for years been trying to secure from our legislature an appropriation of two hundred and fifty dollars annually, that the grand work of such men as Governor Hoard, Prof. Alvord, Prof. Robertson, Prof. Roberts, Mr. Gould, Mr. Smith, Mr. Edmunds, Waldo F. Brown, Mr. Talcott, the chemists from the experiment station, and the scores of other able teachers in our calling who have been with us from year to year, could be printed and distributed among the farmers of the state within sixty days from the close of our conventions, instead of

being compelled to wait for two years, as is now the case. The dairy-men of Pennsylvania are not possessed of sufficient wealth to permit them to come here in person from remote portions of the state, but we ought to be able to place a copy of our proceedings in the hands of every dairy farmer in Pennsylvania who may desire it within sixty days from our adjournment. Is there anything unreasonable in such a demand? And yet the respectful request of your president to the authorities controlling appropriations did not even elicit a reply. Let the Pennsylvania railroad go before the legislature of this commonwealth with any proposed measure affecting their interests, and witness the alacrity with which our legislative solons place themselves in respectful and subservient attitudes before their master. Our national congress have been debating for weeks where they should spend a few millions more or less of public money in giving a great exposition of our progress as a continent. Weeks of time can be given to debates with a view of securing some partisan advantage, but a measure before congress affecting our agricultural interests, with ninety out of every hundred members, becomes the subject for a jest or jeer, and is laughed clear down Capitol Hill into the mud of the Potomac. Who is to blame for this condition of affairs? I am and you are. Almost the only law directly benefitting us, ever placed among our national statutes, was championed through the senate by Hon. Warner Miller, since relegated to private life, and since defeated for Governor in the great commonwealth, the interest of whose sons he had so valiantly championed. Of the two gentlemen who conducted the fight against oleomargarine in the House—Messrs. Scott of Pennsylvania, and Hatch of Missouri—Mr. Hatch alone remains. The President, whose signature made it a law, is now a private citizen, made so through the votes of those whose interests he had sustained. Regardless of partisan politics my judgment is that, as farmers, we should support with loyalty and zeal those who wage successful conflicts where our interests are at stake. The organized farmers can demand of candidates for official position first, touching their honesty and ability, and next as to their position relative to the great questions involving our interests. To-day the politician demands your suffrages because you and he are of the same political party, as if when a man became a member of a political party he had taken a steadfast vow to support that party, right or wrong, and laid aside all of his rights as a free moral agent. Once elect the politician to office and note how heedless he is apt to grow of those matters which affect your interest. He is astute enough to know that your party prejudice will give him your vote again, regardless of his actions inimical to your welfare. In India, two hundred and forty millions of natives are held in subjection by an army of Europeans numbering only sixty-four thousand. Why? because the Europeans are organized and disciplined.

In America thirty millions of people engaged in agricultural pursuits are dominated and controlled by thirty thousand politicians. Why? Because the farmers like the East Indians, unorganized and undisciplined are unconscious of their tremendous powers. Let the farmers unite and they can demand of their legislators that their condition shall receive as much attention as is given to manufacturing and commerce. Congress appropriates annually from ten millions to twenty millions of dollars for the betterment of commerce, and buys your votes with a few packages of "Improved Political Pumpkin Seeds" and wonders why you are not happy. The wealth of America comes chiefly from the pork, corn, cotton, wheat, cheese and butter, oats, beef, tobacco and other

products of your farms which are exported to the extent of about five hundred million dollars. The products of your farms and the fruit of your toil have made the nation rich, and have not given the laborer his portion for hire, which the Good Book accounts him worthy. The value of your products have rolled back to our shores in golden streams, and you are not the ones who are bathing in those golden waters to any considerable extent, so far as I can learn.

We, as farmers, have a just, equitable and imperative demand to make of our statesmen. We demand that our interests shall be protected in proportion to other interests. It is proper that we demand it as manufacturers of those materials which are necessary to the very life of the individual, the state and the nation.

It seems only fit that you consider this great question, and consider it carefully, and see if you cannot find in some points a reason why we should ask these importunate statesmen who shall seek your suffrages next fall what their views are in relation to this subject.

I thank you for your kind attention, and did not expect to detain you one-fourth so long. I may have said too much; I could not say less and feel my duty done.

At the conclusion of the president's address, F. W. Edmunds, of Sherman, N. Y., delivered the following address:

MR. EDMUNDS' ADDRESS.

MARKETING OF DAIRY PRODUCTS.

Mr. President and Members of the Association :

The subject assigned me I believe to be one of the most important now before the American farmer. It is a subject well worthy the attention of our leading writers and statesmen. In order to get at this question as I would, I must beg you to allow me to treat it in my own way, giving you my own experience; and then if I have said anything worthy of future thought I shall have added something to this—the great question of the day. I cannot go outside of my every-day life for subject matter. As I go upon the markets and meet our fellow tradesmen, meet the consumer as well as the dealer, I want to take you with me, if you please.

Examine Webster's dictionary and you will agree with me that "manufacturer," not "producer," is a better term to use when we call up the dairy business. I wish to speak of the person who takes the raw material and converts it into the finished product, ready for the consumer.

We must unite the farmer and the factory-man as one; for in sound reasoning, the one is incomplete without the other. I will use the term manufacturer when I speak of the parties connected with the cow, the milk, the factory, the butter or cheese.

Location has much to do with the successful marketing of dairy products. A large amount of good milk must be taken to a central point where it comes under the skilful management of an expert maker. There is no profitable market for inferior goods. No salesman can sell second rate for first-class goods, and take the second order. The rivalry

existing between factorymen for milk on the "divide" is working great injury to the business. Let factories unite, combine if you wish, and this is done away with. The selection of a salesman is work that requires great care. Patrons will go to the annual factory meeting and haggle over a very small fraction for making, and overlook a greater question. Right here they may succeed in securing a reduction of ten cents a hundred for making, and then elect a salesman who will lose them a cent a pound on the entire product. *Salesmen are made, not born.* If you have a good one, keep him, that he may add experience to experience, and profit to you in the way of higher prices.

It is a trade to sell dairy goods. It requires a man of pleasing address and good habits, a man who knows the quality and value of what he offers.

Much has said about the scrub cow and the scrub farmer. Yet who dares to mention the scrub salesman? one who, on salesday, is found at some saloon bar, taking a drink at the expense of the buyer, who is arranging things for a good bargain? A good salesman is one who, when once a good sale has been made, looks around to see where he can make a better one the next time. You cannot make a good salesman of a man by giving him second-class goods to sell. See that quality is right, and if he is made of good material he will improve with experience and be able to secure outside prices. Quality is as essential in goods as in salesmen. The world moves on. "He who cannot offer a remedy ought never to criticise," is a motto we might well follow. Right truly I might say, farmers and dairymen, organize and conduct your business on true business principles, and then take my seat. Yet I cannot, in so many words, impress upon you the great necessity of a change.

Go with me to a Buffalo commission house; let us examine the great number and styles of butter packages. In one store you can see over fifty kinds of packages, and in the fifty packages one hundred or more kinds of butter, and with it changes become necessary. Take, if you please, our great commercial, manufacturing or labor organizations, and compare the present with the past. By organization labor controls capital. Manufacturers meet, agree upon a price and sell their product at a uniform price and at a profit. The commercial interests are as a unit. Competition is unknown among our transportation companies. Agriculture, more important than all other industries, is without organization; and from this fact it stands alone and at the bottom. Its true place is at top, and should lead all others. Investigate this matter closely and you will agree with me that organization and systematic business principles only can save and restore to this, the largest, the foundation of all other systems, to its millions of workers, proper compensation for labor and capital invested.

The salesman has no confidence in uncertain goods. He knows that if it is sold for first-class butter it will be returned and his customer driven to other dealers. A low price is made which, in the end, comes out of the farmer manufacturer. It is but a very few years since "June" butter was sold and used for winter consumption. Only a very short time since October butter was made the standard and the butter for winter use. To-day all this is changed, sound, sweet, clean-flavored October creamery butter is a drug on our markets at eighteen cents, while fresh churned butter, made from new milk, sells freely at twenty-eight and twenty-nine cents a pound net at the creameries.

The consumers have learned to like fresh butter, they demand it and

are willing to pay the price. Your salesman, aware of this fact, seeks this class of trade to your profit.

I have arranged a chart to show you the advantage of changing your part of the work. I will show you the price of butter, the amount of milk required for a pound of butter and the net value of a hundred pounds of milk for the different months. Give your salesman a well balanced yearly supply of butter so he can say to his customers "I will supply you regularly each week during the year with so many packages of butter at the market price," and you have given him a long lever which he will use to your advantage in raising profits. I find the larger portion of our consumers are willing to pay the price, providing they get the quality. It is only a question of time when the manufacturer and consumer come nearer together. One middle man or distributing agent is necessary.

You must study to lessen the cost of your feed and to increase the demand for fresh butter at an advanced price. We know that a larger amount of fancy butter is consumed in the winter than in summer, by our city people. Our supply has been the largest when the demand was the lightest. I will say that an immediate change is imperative, for dealers are yearly losing more money on held goods, consequently the solution of the whole question is with the manufacturer. The patrons of one of my own creameries last fall thought it best to hold choice October butter for a rise. In thirty days the market for fresh butter advanced to twenty-eight cents. This butter was offered at twenty-four cents, it has been held until recently and then offered at eighteen cents, with no takers. This butter four years ago would have sold at the top of the market. No salesman can now get within ten cents a pound the price of fresh made, or within six cents of what could have been realized when made.

Farmers, you cannot afford to speculate. Sell as fast as you get your goods ready. In the eastern part of my own state, there are a line of creameries that have been accustomed to packing their summer butter in firkins and in the fall selling at an advance over ruling prices, when made. They are now selling at six to twelve cents a pound, butter that could have been sold when made at thirty to forty per cent. more money. The loss is on the farmer as usual.

We need a larger foreign market for our best butter; more attention paid to this and less to office seeking by our representatives would result to our mutual advantage. Now we export very little, if any, fine butter. We ship wool grease and bear a valuable and wide reputation in England and foreign markets for this, the only known American butter.

Old, held butter, sent abroad, stands hand in hand with skimmed cheese, both known there as American goods, destroying the true representation of our best American makers' products. We offer them this rubbish and then contrive to market the eighty per cent. used at home on a basis of the value of our exports. Such a system as this would, in a very short time, wreck the largest manufacturing interests; and if continued, in a few years will wreck our dairy interests. Knowing this, is it not the duty of each one of us to help bring about a change for the better?

Parliament in Australia says to the dairy farmers, "we will give you one cent a pound on butter that sells in England at seven cents, two cents a pound on that which sells at sixteen cents and three cents a pound on butter that sells at twenty-four cents a pound. The result

is all that can be desired and English people are now using butter made in Australia, at higher prices than American goods can be sold at. She goes to New Zealand in the same way for cheese.

In 1880 Canada made and sent abroad 15,000,000 pounds of cheese, in 1888, 54,000,000 pounds, at higher prices than American goods of better quality could be sold at. Farmers, there is a cause for all this, and you will make no mistake if you investigate this question. It is only a few days since eight cars of eastern butter en route west met five cars California butter coming east. Wrong methods here again. We must change this. The \$400 freight comes out of the manufacturers. A noted politician and scale manufacturer in my own state boldly advertises to "pay the freight." The multitude of lesser manufacturers pay it the same way yet secure no profit for their work. Creamery men in Connecticut have recently organized, not as a trust, but to better market their product. This is a step in the right direction. It will result in better goods going to the consumer, and better returns to the farmers. We have no ships sailing from our ports to foreign lands that are fitted up to successfully carry our finest butter abroad. This is a matter that must be given immediate attention.

No one will deny that, with present methods of marketing our dairy produce, and the rapidly increasing production, we will have low prices and have to run our business at a loss. Let us arrange to export a large amount of fine, fresh butter; arrange to let the consumer at home have fresh churned butter to use. You all know that a pound of old butter will last a family longer than two pounds of a sweet, well made article. Note this and double at home as well as abroad.

One day last week, while on a business trip among the Buffalo dealers, one of the leading men offered to deliver ten cars of sound, sweet, summer and fall butter at ten cents a pound, and at the same time he was selling fresh churned winter creamery butter at thirty-one and thirty-two cents a pound.

Mr. Edmunds exhibited a chart which showed the advantage of winter dairying, giving prices obtained during each month of the year, which showed an average of thirty per cent. during the winter months.

I have prepared the following statement, to clinch my argument, and show the strength of the position I have taken. These figures are taken from the secretary's record of the Sherman Cheese Factory, at Sherman, New York, and a careful study will show that the most money is made outside the summer months:

Statement.

DATES.	Amount of Milk for 1 pound butter.	Per 100 of milk.	NET VALUE.	
			Summer.	Winter.
January 1-15,	20	1.32	.....	1.32
January 16-31,	19	1.30	.....	1.30
February 1-15,	21	1.31	.....	1.31
February 16-28,	21	1.29	.....	1.29
March 1-15,	23	1.13	.....	1.13
March 16-31,	24	.97	.97	.97
April 1-15,	25	.90	.90	.90
April 16-30,	24	.79	.79	.79
May 1-15,	25	.64	.64	.64
May 16-31,	25	.62	.62	.....
June 1-15,	25	.64	.64	.....
June 16-30,	24	.65	.65	.....
July 1-15,	24	.65	.65	.....
July 16-31,	25	.63	.63	.....
August 1-15,	22	.75	.75	.....
August 16-31,	23	.77	.77	.77
September 1-15,	20	.89	.89	.89
September 16-30,	20	1.09	1.09	1.09
October 1-15,	20	1.13	1.13	1.13
October 16-31,	21	1.02	1.02	1.02
November 1-15,	20	1.10	1.10	1.10
November 16-30,	19	1.25	.....	1.25
December 1-15,	19	1.34	.....	1.34
December 16-31,	20	1.31	.....	1.31
Average,	22	.98	.88	1.09

Need I add anything to convince you that we are on the right track when we advocate winter dairying?

We take great pains in putting our butter in convenient and attractive packages. This a great factor in our success. To illustrate the force of this point let me give you the result of a little careful work in handling eggs. I concluded that my milk patrons were not realizing the proper profit for their eggs. I carried into execution the plan of handling their eggs for them. Each farmer was furnished with a rubber stamp with which each egg was labeled with the producers' name, and the date of production. This secured care in selection and handling. The reputation of the producer was at stake and he could not afford to be careless or dishonest. The eggs are brought to the factory where they are prepared for shipment by placing them in packages of one dozen each. Mr. Edmunds here exhibited a package similar to those used. I handle the eggs of about seventy farmers in this way; and, as the result they realize an average of three cents more per dozen than those who market their eggs in the old way. So you must change your mode of marketing butter.

DISCUSSION.

W. W. DEAN. How shall farmers organize.

Mr. EDMUNDS. That's the difficulty, I spent twelve years organizing a single factory. Thirty factories in Connecticut are in trouble and

have held a meeting to organize, to save themselves. We must stop this bidding business. The patrons must coöperate with factorymen to obtain a good article and then market it fresh. Put none before the consumer over four days old. The poor article spoils the market.

Mr. McNANY. What kind of packages do you use?

Mr. EDMUNDS. I pack in wood and tin of many different sizes from two pounds upward. I would pack in glass if the consumer demanded it. Corn in Sherman is thirty-five cents at wholesale. The freight on this was twenty-two cents, leaving thirteen cents to the producer. How long will this take to ruin him? You are coming along the same track. Organize; get a factory of your own. Get good milk; forget to skim it; sell your products fresh, not more than three or four days old. Some factorymen won't like what I say. Have your drummers stop hunting milk and hunt a market instead.

Mr. TUCKER. Is your butter marketed in the large cities?

Mr. EDMUNDS. Usually nearer home. I am afraid of New York city. The common herd go there. Pay a good man for making your butter, sell it fresh and you can always find a good market.

Mr. DEAN. How far apart should factories be so as not to interfere?

Mr. EDMUNDS. Five or six miles is a sufficient distance to haul milk for butter, three miles for cheese. Cream can be hauled farther. I consider that no system but the centrifugal should be used.

You have been keeping butter in your way; your storehouses are packed full to-day. You have got to change this system. The president made some remarks to-day which you should study.

A member. Why did you organize, and what can be saved by it.

Mr. EDMUNDS. Gentlemen, that is just what is the matter. I have spent seventeen years in this business, working with the farmers, and selling their products. I spent twelve years organizing a single factory that was trying to run itself, and we could never succeed until we got organized. There are thirty factories in Connecticut that are in trouble and have held meetings to organize their business so as not to interfere with each other. You go down among your patrons, drumming, trying to get A.'s, B.'s and C.'s milk, and this system is doing more damage to the dairy industry of this country than anything else. The drummer will come to the farmer and he will say, "I will give you so much for your milk." What will you do with them? they are up for sale. Go to the factory meeting and say. "We will give you so much milk, and we want you to market our product." And then elect a good man for salesman and you will get high prices. No commission men can get my butter. My butter goes to market every two weeks. During the past two months our butter has brought twenty-nine cents per pound. At Cambridge to-day it is sixteen cents.

Mr. McNANEY. What kind of packages do you use?

Mr. EDMUNDS. Whatever kind the customer wants. I use two, four and eight pound packages, five to fifty pound tin, and ten to one hundred pound wooden packages. I would pack it in glass if you would pay me my price.

Mr. DEAN. How would you commence to form an organization, as a direct way for the farmers to organize?

Mr. EDMUNDS. I would like to answer this question with another question: Corn costs thirty-five cents wholesale at Sherman; the freight on that is twenty-two cents per bushel; commission two per cent. The farmer gets eleven cents. The grain raiser is bankrupted, and who gets the profits? Dairymen, you are coming right along

behind the grain men, and if you have got a factory man in your midst that will not come to terms, and you cannot buy him out at any price, you can build a factory and run him out. Then, if you have got a factory of your own, you go to work and arrange for an early supply of milk, and forget to skim and water it; a good class of milk can be made into good butter, and after you get a good article get some one to sell it immediately, and not keep your butter over three or four days, but let it go.

I know factory men make a mistake when they go around begging for milk. A. will draw milk for seventy-five cents when it is worth two dollars, and he knows it. You had better have him stop searching for milk and hunt a market.

Mr. BOLE. Would you recommend to the farmers of western Pennsylvania to go into this winter dairying exclusively?

Mr. EDMUNDS. I would recommend what I call year-around dairying—make cheese in June, July and August and half of September; the balance of the year make butter, and in order to do that you must have a combined factory for cheese and butter making, and that gives the maker work the year around. The summer of the past year and the summer of the present I have had customers on Fifth avenue, New York, and I have several large checks for butter. I like such a trade, and you can get all you want of it.

Mr. TUCKER. Is your market in large towns?

Mr. EDMUNDS. Usually nearer home. I am afraid of New York city; the common herd go there.

Mr. DEAN. How close would you recommend the establishment of factories?

Mr. EDMUNDS. Milk shouldn't be hauled more than three miles to a cheese factory and six miles to creamery. Cream can be hauled any distance, but I would not think of using any but the centrifugal system.

Mr. PRICE. Did I understand you to say that cheese can be sold weekly?

Answer. Yes, but you must cure it first.

Mr. BOLE. Would you advise the general dairyman to go into winter dairying?

Answer. Yes; make cheese from June to September, then butter the rest of the year. Never stop. Get an expert to make your goods, and you be an expert to find market for them.

Mr. FULLER. Several questions have been asked Mr. Edmunds in regard to organization of the farmers. I think Mr. Edmunds will admit that his success in the business has been largely due to the personal ability and efforts of Mr. Edmunds. We want duplicates of Mr. Edmunds. We have in Crawford county at least one man who is handling Crawford county cheese, and he is giving us excellent goods; that is Mr. Magaw, and I believe and know that the price which he obtains is from one-half to one cent per pound more than would be procured by the individual, and we have men in Crawford county who are successfully marketing their butter and are getting good prices for the proper kind of article. One of the gentlemen I refer to is Mr. McClintock, and I will say that I had a letter from the city of Erie about two months ago, asking if I could get some good butter for — of Erie, and I am ashamed to say that I failed to fill the order. Now, there are good customers for all the good butter we can make in this county. I am paying to-day, and the year around, twenty-seven and one-half cents per pound for my butter. There are plenty of others who are standing

ready to 'pay this price for a good quality of butter, and this kind of organization of farmers is all that is needed. There is no organization that will bring it about or change the price to the individual farmer.

Mr. EDMUNDS. To show what organization can do, let me call your attention to the fact that, by coöperation of farmers in Chautauqua county, we have succeeded in obtaining paying prices for eggs. As previously noted, patrons bring their eggs regularly to my creamery with their own brand on them. These eggs bring three cents above the market price.

Mr. JOLLY. Would you advise farmers, such as I am, to make butter the old way? I live in the lower end of Venango county; we have no factories that make butter; we have a home market and that is supplied once or twice a week, the year around. We get twenty-eight cents, and we have a few customers that pay thirty cents. Now under these circumstances would you advise us to continue in this way.

Mr. EDMUNDS. If you are getting twenty-eight cents for your butter, keep on. I know about thirty farmers who have got their butter packed and they cannot sell it at any price. Go and get yourself some crocks, good looking crocks, pack your butter fresh from the churn. Then go to a town and get some customers and say, "I will furnish you a crock of butter every week," and the fact is you will find market for a large quantity of your milk product.

Mr. ROCKWELL. Don't this man waste his milk by handling it in the old-fashioned way?

Answer. Possibly, but not necessarily.

Mr. CHASE. But which is best, deep or shallow setting?

Answer. I prefer deep setting, but I would advise three, four, or five of you to club together and put in a separator of your own. I should use deep setting in preference to the shallow.

Mr. HUIDEKOPER. It was asked how can the farmers organize? I can see how we can organize, and I can see how we can get and save money by organization. We have two creameries here, one above town and one below; the men came to me a year ago and said, "will you send your cream to the creamery?" They guaranteed to pay, and we would not need to kill our wives by making it at home, but I found that they make a profit at your loss. The creamery below town I think has not paid for September or October, and now if we would organize, instead of selling our cream to some shyster to make into some bogus article, or do something with it for his own benefit we would improve our condition. If we would organize and take both of these creameries and put in a good sound man to run either one or the other, we have got plenty of farmers around Meadville who would put in plenty of milk for both of these factories. These factories can be made to earn and pay us better than they have done before.

Mr. EDMUNDS. The gentleman has made some good points. Never sell your milk or cream or place your buyer among a class of shysters. Now if I were a farmer of this section I would call a mass meeting and I would organize and elect a man who would make a good salesman, and pay some good man sixty or seventy dollars per month for making our butter; a good salesman would get good market for all you would make. Send it there every week and divide up every week and you will never regret your move. I never knew a man who bought milk who did not go under. In our state, a man who takes your milk and makes no return goes to prison.

Mr. CRITCHFIELD, of Westmoreland. I would like to say a word right

here, for I am very deeply interested in this subject. We have but one factory in Westmoreland county, and there is but one creamery there. The man running the creamery has no business with it. It ought to be in the hands of farmers. The creamery can be bought very cheap, it can be bought for less than cost. Would it be a good investment?

Mr. EDMUNDS. Are you afraid to work?

Mr. CRITCHFIELD. No, sir.

Mr. EDMUNDS. If not, go and get some one to work in the creamery. And when you go home go to work and get a hundred farmers to turn out their milk, and you buy that creamery just as quick as you can, you can make it pay.

Mr. CRITCHFIELD. Who owns the factory you have described in your state?

Mr. EDMUNDS. I do.

Mr. CRITCHFIELD. By what system do you run your factory?

Mr. EDMUNDS. On the coöperative.

Mr. CRITCHFIELD. How many pounds of milk do you take for a pound of butter?

Mr. EDMUNDS. It takes twenty-six pounds of milk to one pound of butter.

Mr. CRITCHFIELD. Well I know this much; that if I thought it would be a good thing I would buy our factory, for we are in a good location. We are right in the center of the great coke region. I am a retail milk dealer. Am selling on an average three hundred quarts per day. Have now twenty seven head of cows. A month ago I had fourteen. I am selling milk at fourteen cents per gallon. I can buy grade Jersey and Short Horn milk, delivered at my door, for ten cents per gallon. Can we get any more money out of our milk to make it into butter?

Mr. EDMUNDS. No, sir, that is safer, and when the farmers can get fourteen cents a gallon for their milk they are fortunate.

Mr. HEMPSTEAD. In shipping these small packages (two or four gallon crocks) do you use any ice?

Mr. EDMUNDS. No, sir.

Mr. HEMPSTEAD. How long is it on the road?

Mr. EDMUNDS. It leaves at half-past four P. M. and gets into New York at eleven next morning. I have one or two customers in Brooklyn.

Mr. FOWLER. Did I understand you to say that when milk came a distance of six or eight miles you put it right into the separator?

Mr. EDMUNDS. Yes, sir. We warm the milk before putting it in the separator up to seventy-five degrees.

Mr. FOWLER. Then in hot weather do you do the same?

Mr. EDMUNDS. We don't have to warm it in hot weather.

A MEMBER. Does it not churn when drawn so far?

Mr. EDMUNDS. No, sir, it does not churn. If it is a hot day when the milk arrives, you must cool it right down to fifty-five degrees, and then warm it up to sixty-five degrees before putting in the separator.

A MEMBER. How long after you have separated it before you churn?

Mr. EDMUNDS. We churn it the next morning after separation.

J. M. GILL. Does the distance, affect the separation, or the quality of the butter?

Mr. EDMUNDS. No, sir. If the milk arrives at the factory sweet so that it can go through the machine before it clabbers, or before it sours, we can get all the butter out of it, and get good butter.

Mr. FOWLER. Do you make any difference in the milk that you get from different cows?

Mr. EDMUNDS. No, sir.

Mr. CROOKER. Do you notice any difference in the quality of milk now, and when you commenced? Does it take more or less milk to make a pound of butter?

Mr. EDMUNDS. It takes less. I have hired men to come and instruct my patrons on the subjects of breeding and feeding. They used to throw meal to their cows, but they don't do that now. They have been trying to improve their methods and have succeeded.

Mr. CROOKER. When it takes twenty-six pounds of milk to make a pound of butter is not the milk poor?

Mr. EDMUNDS. Yes.

Mr. FOWLER. What kind of a separator do you use?

Mr. EDMUNDS. I use the Danish Western, it is a good machine. I am not the agent for these machines.

Mr. PHELPS. I am on the anxious seat; I feel considerably interested in this question. It is the very question for a country of this kind and for the dairy interests of this section. I take a far different view of this matter. I believe that the organization of the farmers commences right here among ourselves. I have made cheese for the last seventeen or eighteen years. I have made up from one to two million pounds of milk per year, and I am satisfied that it takes a very iron-sided man to run a factory, there are so many dishonest men that we have got to take into the organization. I do not believe that the Crawford county pooling of milk is going to be a success.

When I go out to my neighbors and see the cream that goes to the factory, it is no wonder to me the factories run down. Don't talk about organization, you are organizing damnation. Be honest and then you are going to be successful. Now that is my idea of this. When I see cream sent to a factory a week old I tell my neighbor there is a short stay for a factory of this kind. Now, as I said before, I do not believe in pooling milk. Get it through the separator, that is the only way you can make it a success.

Mr. EDMUNDS. You cannot make fine-flavored butter by the deep setting system. The separator not only takes the cream out of the milk but it leaves the impurities with the skim milk.

Mr. PHELPS. I believe that the true process for the dairymen of this country is for each to make his own butter. I don't mean to say that this will be the best in the future; but till you understand how to take care of your milk. Now I believe you can make more butter with less milk than to pool it all together. You can grade your herd to a certain grade and get more butter; for cows of a different kind cannot mingle their milk together and have the churning come together and so get the whole of the butter, a part is lost.

When you have good cows and you are making a fine class of butter you can sell it just as well as Mr. Edmunds and get just as high a price.

They have large dairies in his state and have been studying these things for years. There is a great deal to learn in this matter of marketing these goods and the keeping of cows. I don't believe that organization is the system at all; for just as soon as you pool your milk and buy a lot of worthless and watered goods your trouble begins. The Judases must be kicked out.

Mr. EDMUNDS. I am not a very good judge of human nature, but if a hundred boys and men will come into a hall I will pick out a man

that will run your factory and sell your butter successfully, if he knows how. You want a boy, when he goes to the city, to keep away from the saloons; let him go to a respectable hotel and be a man.

Mr. JOLLY. I think there is but little good derived from a salesman. Now if I had a good article I never had any trouble about finding a good market for it, at a remunerative price. The man, of course, or the salesman, must be neat and tidy in his habits to sell butter, I am a very poor talker but I have always succeeded in finding a market for my products.

Mr. HOWARD. As has already been remarked I am not a member of this association, but in regard to what has been said about organization of the farmers I agree with Mr. Phelps. Now, then, here we have factories but a few miles apart, while we have fifty to five hundred farmers to each; now it is a much more difficult matter for the farmers to get together and organize than it is to let the factory men stick to their rules. Never buy one pound of milk; never go out seeking after milk. Let the farmers bring the milk in, and if it is not good send it home. It is impossible to make good cheese from poor milk. I started a cheese factory with the expectation of manufacturing seven to ten cheese, but we got up to nineteen or twenty. The factoryman kept his own milk out entirely. We shipped as often as once a week. After thirty days a dividend was struck. I closed my factory on the first of November. I put out a final report and paid an average price per hundred of seventy-two to seventy-three cents, and my patrons were well suited.

Mr. PHELPS. Do you not think that in time, and that not very long, that it will pay a better profit than the cream to make cheese through the winter?

Mr. EDMUNDS. No, sir; your milk is thinner in the winter than in the summer months, and you cannot make a fine-flavored cheese out of winter milk. You can make enough cheese in five months, to be consumed in the United States, and then make butter the balance of the year, and use it at home and let the foreigner go. Five months cheese, seven months butter. I say there are more scrub factorymen and scrub salesmen than there are scrub cows in the country. A farmer who has fifty cows, came to me this winter; he hemmed and hawed, said that three cents, for making butter, was a high price, and that we had to make up his milk for a little less. Another man is working his milk and he is welcome to it. The reason was, he could get his butter made for two and a half cents. Farmers, don't make jockeys of your factorymen.

Mr. SMITH. Do you churn your cream sweet or sour?

Mr. EDMUNDS. We ripen it. I do not believe in making sweet cream butter. I was in New York looking at the butter extractors, and the good old way is good enough for me.

Mr. JUDD. Did I understand you to say that it spoiled the milk to feed corn meal?

Mr. EDMUNDS. Yes, sir; you spoil the milk by feeding corn meal, and you set the cow's whole system into a feverish condition. At my mill, fifteen tons of bran is sold to nine of meal.

Prof. ARMSBY. Why do you not believe in sweet cream butter?

Mr. EDMUNDS. The best market we have is in the oil regions, and they have gas fires, and most of the houses are inconvenient for storing it, and you put a tub of sweet cream butter into a private family

house and it will spoil. Therefore sweet cream, in my mind, will have to be made for a certain trade.

Mr. PHELPS. Why does it spoil? I know it is so but I don't understand it.

Prof. ARMSBY. I don't think I could tell you.

Mr. PHELPS. My idea, gentlemen, is this; souring of the cream causes a separation between the casine and fat. Now sweet cream butter has no casine in it, and where there is casine there is a mucus, and by souring it and ripening it successfully you will extract it from the cream.

Mr. ARMSBY. What makes the wife mix the yeast pot? This is the same thing. As to Mr. Phelps's explanation why sweet cream does not keep, I would say this, that there is some casine in any kind of butter.

Mr. CRITCHFIELD. I want to know something about the dollars and cents you paid that man that left you, and how many cows did he keep?

Mr. EDMUNDS. I paid that man, in 1888, over seventy dollars a head, he had forty-six cows for which he received about thirty-two hundred dollars.

Mr. CRITCHFIELD. What did you do with June, July and August, was that included with the rest?

Mr. EDMUNDS. That was for the whole twelve months.

Q. Did he not give these cows a rest?

Mr. EDMUNDS. We do not give cows any rest in our county. We want a cow to work for us ten months out of the year, and take two months in getting ready for ten months. Cows that have been in milk nine months will give milk richer in butter fats, so we mix the new milk and the old milk. One adds quantity and the other quality. I find that by actual experience. I sell butter in New York that goes to the West Indies.

Mr. GAGE. I am rather pleased at the idea of thirty-two hundred dollars from forty-six cows. I would like to know how much grain this man fed, and how much would be taken from thirty-two hundred dollars.

Mr. EDMUNDS. This gentleman bought all of his grain at my mill. His feed cost him considerably less than nine hundred dollars per year; about twenty dollars per cow. He fed in the summer. This man's pasture was always green when other pastures were dried up, and he kept a larger number of cows per acre than any other man.

Mr. PHELPS. Does he soil it?

Mr. EDMUNDS. No, sir.

Mr. GILL. How do you ripen cream?

Mr. EDMUNDS. When the cream has a soapy appearance in the cream pot we churn it. It will have a slight acid flavor.

Mr. JAMES. How old butter have you eaten to your knowledge, and how long can butter be kept good? I have had butter forty-nine months and twenty-one days old, and we ate it right along, and it was palatable. The circumstances were such that we could not get any other as we were on deck on a whaling voyage. I imagined that our taste changed as the butter changed, and we never knew it.

Mr. EDMUNDS. Gentlemen, what you want to bear in mind is, that you must make butter that will not keep; make it so good that just as quick as it is made it will be consumed.

Mr. PHELPS. I raise my cream in the winter with the Cooley creamer, and I get good eatable butter, and we do not hold it for anything in the future. I want it to go right to the consumer; I ship my butter every week. The great trouble is, the farmers do not come here to

learn and how are we going to approach them and get them to know. If we put it into the papers, they would rather read *Saturday Night* or something else. The great question is how are we going to approach these people? I have taken all manner of pains to invite them, but they will not come.

Mr. COCHRAN to Mr. PHELPS. What do you think of these farmers' institutes?

Mr. PHELPS. I think they are profitable things. We have had some very good ones. I can say that there has never been an appropriation made by the state to benefit the farmers so much as these institutes have done and if they do not result in some good I will be wonderfully disappointed. And I will say when the president was delivering his address here to-day I thought it cast a very dark gloom over the farmer. I believe to-day that the farmers are opening their eyes, and are stepping up to a higher grade, but we have got to work if we succeed in our business. Now the men who are making from fifty to seventy-five dollars per cow are making money. Why can't we all do this? To know how is the wonderful secret of it.

Mr. CROOKER. What is the best method of handling butter where three or four kinds have to be put into packages, when the person wishes to ship.

Mr. EDMUNDS. If I was a private dairyman I would have a package for each churning. There is a house in Chicago for handling private farmers' butter. I would never pack three or four kinds of butter in one package.

Mr. CROOKER. Does it not cost too much?

Mr. EDMUNDS. It does not cost any more to ship five than it does twenty pounds. Get your butter right off as quick as you can.

Mr. CROOKER. Now, how do you want to handle that to get the most out of it?

Mr. EDMUNDS. Well, sir, I have customers on Fifth avenue that use thirty pounds every two weeks. They don't care for the cost; they want fresh goods.

Mr. CROOKER. Are all your customers that way?

Mr. EDMUNDS. Yes, sir.

Mr. CROOKER. A man who is producing twenty pounds per week, what is he going to do?

Mr. EDMUNDS. That is the great object of coöperation, to get a man to handle our business, we paying a reasonable price for it. I know you could go into a town and get customers enough to take your butter.

A MEMBER. Suppose a man has four or five cows, it does not pay him to spend a great deal of time. I can see the advantage of coöperation, then your salesman can get off and hunt a market for your butter. But a great many of our cows go dry three or four months of the year?

A MEMBER. Is there not a good method of handling our butter and putting three or four churnings together?

Mr. EDMUNDS. I do not know.

Mr. McNANNY. I patronize a factory about five months out of the year; the other part I make butter. I find that when I make butter I make a little money, but when I patronize the factory I do not. Now will it pay me to make butter in the summer time as well as in the winter?

Mr. EDMUNDS. There would not be so much profit in the summer time, but there would be in the winter, if you have your stables so that you can keep the cow flavor out.

Mr. McNANNY. How are you going to keep the cow flavor out?

Mr. EDMUNDS. I walked into a barn a few days ago where there were ten cows, that had an average of one hundred thirty-five cubic feet of pure air per cow. I was in another barn where they had six hundred cubic feet per head. The latter man's cows furnish him sixty dollars per cow right along and the other man cannot pay his bills.

Mr. JAMES. You take, right here in the county of Crawford, and let me ask every farmer, What are you going to do? You are going down. What are your interests? Let us, before we begin to say what we want, know what it is we want. No one of us knows what we want. Then let us go to these politicians with our demands in shape. Now let us not hit a politician till we have something to hit him with. A man comes up for senator or congressman, and we will say "You must represent our interests." Well, let us say what our interests are.

Mr. EDMUNDS. The gentleman is right. In our county (Chautauqua) we have twenty-four well organized granges. They are doing more for the advancement of the farmer in material, and social interests than any other thing.

TUESDAY EVENING.

Meeting called to order at 7:40 by the president. He said, "It is with much regret that I am compelled to announce our double disappointment in not having Mr. Waldo F. Brown, our lecturer for the evening, or Mr. Adams, of Wisconsin, who, according to our regular programme, was to have spoken on the topic of How to Make Dairying Pay. Mr. Adams has been confined to his bed for the last ten days, so he is not with us; and Mr. Brown cannot reach the city until 8:50. And now that we have some good talkers with us, I suggest that we have a discussion of various topics."

QUESTION BOX.

A MEMBER. I should like to have Mr. Edmunds tell us the best salt to use in butter and cheesemaking?

Mr. EDMUNDS. The best salt to use is salt free from properties that will injure butter or cheese. I am in favor of home made salt in preference to foreign goods. I think the Genesee Valley salt is the best made.

Mr. JOLLY. What do you think in regard to brine salting?

Mr. EDMUNDS. We do not use the brine salting. We have tried it, but not with good results. I would like to hear from some person who has had experience in brine salting. Years ago I bought common barrel salt, and put it in my cheese, but I do not do it any more.

Mr. CHASE. How much do you work your butter?

Mr. EDMUNDS. During the winter months, from the 1st of October to middle of April, it is worked once, rolling it on the butter worker. In the summer time we let the butter stand from sixteen to eighteen hours before working the second time.

A MEMBER. Does it pay the small dairyman (ten or twenty cows) who practices making cheese in the summer, and butter in the winter, to get the largest milkers regardless of breed?

Mr. PHELPS being called upon to answer the question, said: "I would be much pleased if some other member would answer the question, as perhaps, we would not agree in regard to that subject. I would say yes, if you are going to make cheese and butter both from the same animal, I have no doubt this will be contradicted by members of this Association, but I will answer yes. I am not one of that class of people that think the butter milk and fat go together. I believe there is such a thing as a butter cow, and a cheese cow. And when you combine both together I should like to have a large quantity of milk, and I should be likely to get a large return from my cheese and from my butter. If I was making butter alone, I should want a pure butter cow; then I would get pure butter fat. But if making cheese, the one giving the most milk.

Mr. EDMUNDS. A cow that will make good cheese will make a good butter cow.

Mr. PHELPS. I would like to ask Mr. Edmunds how much butter fat he works into his cheese?

Mr. EDMUNDS. I work in all I can get.

Mr. PHELPS. In regard to the question, the best authority we have is James Robinson; he says you can only work in about three per cent. of the butter fat into the cheese. The best dairy paper I know of in the United States is *Hoard's Dairyman*, and that quotes the same thing.

Mr. EDMUNDS. The quality of the cheese should be taken into consideration.

Mr. HUIDEKOPER. I think you will find large butter-producing cows large cheese producers.

PRESIDENT. SIBLEY. Will Prof. Armsby tell us the quantity of butter fat that can be incorporated in the cheese?

PROF. ARMSBY. I am able to answer that only in a very general way. It will be found that the general run of milk will not have a great deal more fat than it does casine. I think what is known as standard is about one-eighth or one-seventh more fat than casine.

Mr. PRICE. If Mr. Phelps is right, how do you get a better average in the spring and fall than you do in the summer—a greater quantity of cheese?

Mr. PHELPS. I don't think it took more pounds of milk in the summer than it did in the spring. The milk contains more casine toward the period of gestation. I have yet to learn why I cannot incorporate a larger amount of fat in the cheese. Now of course, skimmed milk is not what we want. I do not advocate cream crock cheese. In general, we do not get too much cream in the cheese. For me I do not want a cow to give a disproportionate quantity of either butter or casine.

Mr. MAGAW. I am somewhat mystified on this subject. I can tell when I see good cheese: I am a strong advocate of the butter cow for cheese; the more cream I can get the better. I can only say as to the market value, the cheese that sells at the highest price is the cheese that contains the most cream. I believe there are men who understand working in more cream than others. I have had workmen who could work in more cream than others. And I think a good workman could work in more than a poor workman. And so I think this proves that the limit of working in the cream is not yet fixed.

Mr. COULTEK. I have been making cheese for a number of years; my experience is that we do not get any too much cream in our milk as it comes to the factory. I do not think that all the cream can be

worked in. The cow that gives the most milk would certainly be my cow for dairy—cheese and butter both.

Mr. EDMUNDS. I hold that a cow that is a good butter cow is a good cheese cow, and the cow that is a good cheese cow is a good butter cow.

Prof. ARMSBY It is not the amount of casine alone, but the butter fat and casine both that determine the value of cheese.

Mr. PHELPS. You cannot make cheese from butter fat, but if you take out every particle of the butter fat that can be taken out, you can make cheese from the milk.

Mr. CROOKER. I believe the cow that gives a medium amount of milk is the cow to keep.

Prof. ARMSBY. You want a cow that will give the greatest amount of solids in twenty-four hours. It is not the cow that gives the most or richest milk, but the cow that gives the greatest amount of solids in the same time.

Mr. PHELPS. I agree to that.

Mr. EDMUNDS. So do I.

Mr. SIBLEY. I should like to know if there could be more than three or four per cent. of butter fat incorporated in the cheese. We want to have correctness in this report, and I would like to have it definitely settled. I am reminded of a judge who condemned a man because one man had seen him steal, while ten swore they did not see him steal. An unimpeachable authority (Mr. Edmunds) testifies he has worked in all the fat; ten or a dozen have testified that they have not succeeded in doing it.

I am of the opinion that Mr. Edmunds has the best of this argument.

Mr. TALCOTT. What do you mean by four per cent. butter fat.

Mr. PHELPS. It is four per cent. of the milk that is butter fat. I understand that if we have milk of about three and one-half or four per cent. butter fat, you will lose a portion of it in making it into cheese; and it is difficult or impossible to get in any more.

Mr. EDMUNDS. I believe it possible to incorporate all the fat contained in the milk in the cheese, for I have succeeded in doing it.

Average milk contains, in one hundred pounds, three and one-half pounds of butter fat, three pounds of casine, four and one-half pounds of milk sugar, and one pound of ash; making twelve pounds of solids in one hundred pounds of milk. This would give about thirty-five per cent. of the solids in fat, twenty-five per cent. in casine, thirty-three per cent. in milk sugar, and seven per cent. in ash.

Question 2d. What is the best method of preparing ensilage?

Mr. TALCOTT. Mr. President, I did not intend to appear before you this evening at all. I have been billed for a lecture here to-morrow, in which this is the subject of my paper; and while I should not like to go into any extended remarks, I might say in short and in a brief way, the best ensilage in the world is obtained by having whatever you use for ensilage in a mature condition. If it is clover, you want it as near as possible that state in which it will make the best hay.

The greatest value is when the greatest nutriment is in the plant, but immature silage contains no great amount of nourishment; but, as I said before, I shall present that subject to-morrow.

Question 3d. What is the best plan of a barn??

BARN BUILDING.

By E. W. SHIPPEN.

Near the close of the meeting here last year I exhibited a drawing of what you might call a shed, or barn, on a new plan, which I had taken from the construction of oil derricks.

I have a saw-mill at which I have a large quantity of culled oak planks and boards which were taken from the sides of timber from which we had been sawing railroad ties. A log that was too large for a tie we would take a board off; we had no sale for these culls.

I did not have room enough for my straw in my barn, and so when I threshed my grain the straw had to go out doors, which was a great deal of trouble, and I thought I would use up these culls and build me another barn. I commenced with a foundation sixty-four feet in diameter. In other words you may call it a round barn, or a sixteen sided barn. The joists on each side are twelve feet and five inches long. It is two hundred feet around, and there is not an auger hole in the whole barn except where the hinges are put in the posts. Besides the culled lumber, I had but four sticks of timber sawed to order; the rest of the frame timber was poles taken from the woods and set upon a stone foundation. I had thirty-six holes dug in the ground and put in my posts or joists, and this was the way I constructed this barn. It was sixty-four feet in diameter; just equal in area to a barn fifty-six feet square, or equal in area to a barn fifty by sixty-two feet; either of which would have taken five hundred feet more of lumber on the sides than this round barn, and it does not require as many boards throughout the whole barn as a square one would. My carpenter thought I was going to have a flimsy affair. I put it together with wire spikes, my carpenter said he never saw a frame-work that would stand the test of wind that this one would.

I have made a little estimate of what the building would cost if I had to buy the lumber new; the stone was gathered off my fields, and I do not count them anything. I used thirty-six perch of stone, one barrel of lime, one barrel of cement, about two loads of sand, thirty-two poles; then I had four white oak timbers, and after figuring it up I found it would require about eighteen thousand five hundred feet of lumber to construct such a building, not putting in the lower floor. It would require thirty-two thousand shingles at one dollar and seventy-five cents a thousand, the price at which I had them brought to me. I used five kegs of nails and spikes, one keg of shingle nails, and five pairs of hinges. I paid my mason eight dollars and seventy-five cents; I paid for sixty-four days work at one dollar and fifty cents per day and boarded the hands. I had two hands hired to work on the farm. Counting all my labor I paid out one hundred sixty-nine dollars and fifty-three cents. I estimated the board of these men at fifty cents a day, thus making my labor cost about two hundred thirty-three dollars, and with the material for building, the total cost was about five hundred three dollars; and I have a barn with an area of three thousand one hundred square feet. I will say that it is twenty-two feet up to the beams. I made a little mistake which made my carpenter work cost a little more; at first I had my posts too low, and so had to have them spliced. The stone work is one foot above the ground, and I have estimated that above the floor it will hold one

hundred tons of hay. I put in this season wheat from thirty acres, eighteen loads of hay, and I could hardly see that there was anything in the barn. It occupied about one-fourth of the space of the barn. There is room around the barn for fourteen box stalls. The total cost of the barn was about five hundred dollars.

Mr. ROOT. Is there a basement in the barn?

Mr. SHIPPEN. No sir, it is all open. I am using it for horses. My horses and colts run loose. The building does not require a brace, and if it was turned over on its side I could roll it around. There has been a number of gentlemen to see the barn and they all said that they liked it very much. I would be glad to have you all visit the place.

President SIBLEY. Any one that contemplates building a barn would do well to correspond with Mr. Shippen. He has stored twenty-eight acres of grain in his barn and did not use one-fourth of the capacity. If we have gotten to the era where we can build a barn for five hundred dollars large enough to store the produce from the farm, I shall not be discouraged.

Mr. CRITCHFIELD. This barn could not be built in Westmoreland county for that money. Lumber is fourteen dollars a thousand, and other things in proportion. Shingles are three dollars and sixty cents a thousand. I am deeply interested in this matter as I have to build a barn. I have been looking around considerably. I visited one down in Washington, an eight-cornered one. The stalls are around the outside with the cattle facing inward, but that barn cost three thousand dollars. I have been studying this plan with interest.

A MEMBER. Now if we have had all the information regarding this question, I would like to ask Prof. Armsby what kind of grasses are adapted to the dairyman's use?

Prof. ARMSBY. I did not come here with the intention of talking on this subject, but to get some information, and more particularly to find out what the farmer wants, assuming that he knows. Some of the experiment stations in this country have been taking up this question and studying it in different ways. In the last ten days I have seen and talked to a number of gentlemen about grasses, and I thought I could do no better than come up here and see what you had to say on the subject. In studying this part of agriculture I have found out the number of different grasses in the state. How many kinds do you suppose there are? Well, there are not less than two hundred and thirty different species of grasses growing in this state. How many do you generally grow on your farms; how many do you cultivate?

As a general thing about two; timothy and clover.

Clover is not a grass. Now it looks reasonable that out of these two hundred and thirty species there ought to be some that are worth experimenting with. There are doubtless some grasses that are better than some we have, and then there are doubtless many varieties of the same grasses. This subject is worthy of considerable attention.

President SIBLEY. Are there not some grasses regarded as principally adapted to the dairyman's use? Would you not give us a list of the best grasses for dairymen's use that would, in different soils and climate, be most advisable?

Prof. ARMSBY. I do not profess to know anything about grasses. I would say however, that I do not think any one could answer those questions definitely. I think those who have given the most attention to the subject, would be most ready to admit that there was more that

they did not know than there was that they did know. I think I shall try and find out something about it.

Mr. CRITCHFIELD. Three years last spring I got the Alfalfa fever. I prepared a piece of ground, it was a loamy soil; I gave it a coat of manure and seeded it down with barley and Alfalfa. This Alfalfa, in the fore part of the season, looked pretty favorable; in the fall I had a very fine stand; in the next season I got two crops from it. It yields a tremendous crop but I do not want any more of it. I do not think it is as good as some other kinds of forage that will with proper care, grow just as large a crop. Now as regards the permanent pasture, I have no more faith in it than I have in the general-purpose cow. I have tried sveral experiments, and I have tried Peter Henderson's mixture, but they all go to blue grass. As far as our Westmoreland soil is concerned you might just as well begin with blue-grass as to try anything that has blue grass in it. The Alsike clover does better for me than any other. As a matter of course, I am doubly interested in grasses. I do not believe that the Darlington or any other special pasture grasses are best to be relied upon for pastures.

Mr. CRAWFORD. I tried a year or two to make a permanent pasture. I took Peter Henderson's formulas and made the selection that I thought would be proper for my kind of soil. I wrote to the experiment station of this state, they said it was very good, and I finally got the mixture of Peter Henderson, costing forty-five or fifty dollars, and sowed seven acres. It was an utter failure in establishing a permanent meadow.

Mr. TALCOTT. Do you not think the different localities in this country will have to devise a grass that is natural to that locality?

Will not the Lord have to do a great deal to make our permanent pastures? I know places where blue-grass is grown and it makes good pasture. I have some farms in Tennessee and I have spent a good deal of money trying to grow timothy and blue-grass and other kinds. What will do well in one state will not do well in another. The experiment stations will have to advise us what kind of grasses will grow in different soils. I have some farms in Kansas where I have been trying to grow tame grasses but I cannot do it. The different kinds of soil cannot be so manipulated as to grow them. Our grasses there are called crab-grass I do not expect to see timothy and clover grow there to any great extent. Our experiment station at Columbus is on the same track as is Prof. Armsby here, and we are seeing if it is possible to introduce mixed grasses for permanent meadows.

Prof. ARMSBY. I think there is no doubt whatever but that there can be an improvement in grasses in any localiy. I fully coincide with Mr. Talcott.

Mr. TALCOTT. The man in different localities must experiment for himself.

Prof. ARMSBY. Yes, sir.

President SIBLEY. It does not seem that the last remark was the right thing. I don't believe that when I experiment at a loss of two hundred dollars, that it is right that my neighbor should do the same thing. We cannot afford to experiment. Has anybody ever succeeded in getting a stand of blue-grass except on limestone soil?

Mr. TALCOTT. I don't know but that I ought to qualify my remarks a little, I see Mr. Waldo F. Brown here, from a blue-grass region, and would like to hear from him.

Mr. BROWN. Perhaps my experience will be of little value to you as I live on a different soil, which you may call a blue-grass belt. I have

succeeded in establishing permanent pasture, and I am a great believer in permanent pasture. We can get the very best of pastures. I know blue-grass pastures that have stood for fifty years. I sow one bushel of blue-grass, and as much red-top and timothy as though I had not sown any blue-grass. There is one plant I could not get along without and that is sweet corn. I cut that and feed it to my cows in the fall. There is no grass that will pasture so early or stand as much stocking as blue-grass. We turn out from the first to the ninth of April, and some the fifteenth or twentieth. Then through June, July and August we desire timothy and clover; and then we feed, in addition to that, sweet corn. The blue-grass does best on limestone soil, but it will do quite well on bottom soil. It is a very hardy grass, it will live even where wheat would be frozen out.

Mr. SHIPPEN. What kind of soil do you have in this blue-grass region?

Mr. BROWN. Our soil is lime-stone and bottom soil; it does best on the limestone but it flourishes on our bottom land. The blue-grass is the most valuable grass that we have in southwestern Ohio. I was never so impressed as to the value of blue-grass as I was some eight or ten years ago. The wheat crop and newly seeded grass were killed by frost and cold weather; during the season these fields looked as bare as this hall. When I came across one of these old permanent blue-grass pastures the cows would be turned out and doing well, but where the blue-grass was not used the cows were hard up.

Mr. CROOKER. There should be some way by which we could find out the nature of our soil. We should know how to analyze it, and so find out what elements are lacking in it for plant food.

And then we should be informed as to the best grasses for our soil and purpose. Some four years ago I cleared off a piece of wild ground, I have sowed on that piece blue-grass and red-top. The first year the blue grass did not make much of a show, and now clover has come in quite plentifully, which makes a better pasture than either blue-grass or red-top. I think it is very important that dairymen and farmers should know something practical about grasses.

I think it is important that our experiment stations should give us some light upon this subject. We go on, year after year, ignorant of what we do need. We all know that the manure is good for our fields, but we buy fertilizers by the ton; and, so far as I know, our experiment station gives us no light on what our need really is. Is there not some way in which you can get at it there?

Prof. ARMSBY. In regard to soil analysis, it has not yet been found practicable to give soil analysis which will be of any value. We have had, for years, a soil test in which manures and fertilizers are tested. We shall make an effort at the station to get new light on this subject. We have been told that the managers of the Darlington farms are very particular as to the grasses in their pastures.

Adjourned to Wednesday morning.

WEDNESDAY MORNING SESSION.

The morning session was opened by Waldo F. Brown, of Ohio, who addressed the convention on the subject.

FARM PROFITS.

Gentlemen of the Convention: I feel quite at home before an audience of farmers. I regret to say that you have made a great mistake in leaving your wives at home. What is profitable in farming? It is certain that the profits of the farm are small at the present time; but it is somewhat unfortunate that they are, generally considered, estimated at less than their real value. It is too often the case that the farm is not given the proper credit that belongs to it. We have seen years of much better prices, it is true. You seem to think your farms are not yielding you more than two, three or four per cent. In discussing this subject with Mr. Talcott, this morning, he made the statement that his farms are paying him ten per cent., and some years twenty per cent. I wish I could say the same of my farm, but I find no trouble in getting six per cent profit from it.

There is no other calling in which a man can raise his sons and daughters better than in farming. They are freer from temptation here than anywhere else. They have a chance to commune with nature, and enjoy every advantage of pure atmosphere, pure moral surroundings and the health which exercise brings.

I know a man who has no children, who has been able to add a few hundred dollars to his bank account each year.

He has lived on this farm for twenty-five years, and has it well improved, with good buildings and fences, and a good-sized bank account. But he has not made more than other men, who, having raised a respectable family of children, find a smaller bank account to their credit. The absence of a bank account is no evidence of the absence of profits, but the mistake is too often made to consider it in this light. The majority of the farmers in Ohio (I do not know how it is in Pennsylvania) began without capital. The most prosperous farmers we have in Ohio began with nothing but a pair of strong hands and a determined mind as their entire capital.

We are too apt to sit down and meditate on our lot, calling it a hard one. I don't believe, as many do, that the farmer has the hardest work to do of any calling in life, and that all the easy occupations are found in the cities and villages. I say, without fear of contradiction, that there is no other calling in life in which a man without capital, or with a small capital, say from three to five thousand dollars, can give his family so many of the comforts of life, or make so good a living, or make it so easily, as on a farm.

The opportunities for giving the sons and daughters an education, common school, high school, or collegiate, compares favorably with any other occupation. The danger of a crash in the markets is less dangerous than in any other calling. Now any man that is pitying a farmer because he is a farmer, is making a huge mistake and wasting his sentiment. Then a man who has money to invest cannot invest it in a safer place than in a farm.

A man that is interested in the management of his own farm, can make a good living on it. The rate of profit he shall make from it de-

pends not so much upon the hard work he expends as upon the conscientiousness with which the work is done.

A foreigner who visited this country was wonderfully impressed with the neat appearance of the farms and the nice farm houses, as well as the abundant crops that nearly everywhere greeted his eye.

He declared it wonderful that such improvements could be developed in so new a country in so short a time. The Old Country afforded no such sights. Now, let us get rid of the thought that the farmers are the hardest worked of all classes of laborers in the world. There are hardships untold in the cities, ills from which men shrink, and womanhood and childhood droop and die in the endurance. There are tens of thousands who never get a vacation, but from year to year struggle on in smoke and filth from which there is no escape; while the farmer gets his winter vacation, in which he can lay aside the arduous labors of midsummer and recuperate his tired energies, and store his mind with the rich experience of others. Of the dignity of our occupation there can be no question. It is true that farming is a calling in which the lazy and the uneducated man can make a living; but, in the practice of a thinking man it becomes an advanced science.

We have men with active minds studying the problems which pertain to the occupation of the farmer. There are problems of science there which your lecturers all acknowledge are unsettled and misunderstood. Indeed we are like children playing by the seashore; we see only a narrow strip of shore while the great ocean of undiscovered agricultural truth lies beyond. Animal and vegetable life offer unlimited fields for thought and research.

I will now give a few figures from my books and accounts which I have kept:

My farm consists of ninety acres, valued at four thousand dollars; Personal property, one thousand dollars. The tax on this is seventy dollars. My family consists of seven persons, so I shall credit my farm with the following: breadstuffs, thirty-five dollars per year; dairy products, sixty dollars; which is too low; the butter alone would amount to seventy dollars. Fruits, fifty dollars. I have a cultivated taste for strawberries, and for some years back it has been my object to see how much of the very best we could eat and then sell what was left, or what we could not eat. So I put down fifty dollars for fruit. I always calculate to have small fruits during the whole season, beginning on strawberries. We begin picking them about the twenty-third, of May; then come the currants and gooseberries, and we wind up on blackberries.

Vegetables, fifty dollars. These I intend to have the entire year. With a little pains you can have peas from four to five months.

I have sold more than fifty thousand farmers their seeds. They used to come into the office and buy two or three papers of peas, but now they take three quarts instead. Every farmer should plant no less than two quarts of peas; and, if right management is practiced, the table can be supplied with this wholesome vegetable from the twenty-fifth, of May till the close of August.

Next I put down fifty dollars for eggs and poultry.

Seventy-five dollars for meats. I always manage to have the best kind of hams and shoulders, and always kill a good juicy beef. The next item a good many shake their heads over and that is house-rent. I have a cottage with eleven rooms; this house would rent for fifteen or twenty dollars a month. And I also keep a driving horse for my

family; and I think, counting the last two items; I could count ten per cent on my investment. Now, if I would sell out and let my money out at six per cent, how much would I have left after paying my rent in a town? And, if I kept a horse and cow I would not have a penny left. The farmer can have good fresh fruits and vegetables if he only will, but half of the farmers never eat a strawberry unless the old man can get some cheap ones on Saturday night. Now, what do I make outside of this? My profits are not as large as they might be, but there has never been a year during this time that I have not sold at least five hundred dollars worth from my farm.

Now, if I have said anything to help or encourage the farmer, I have accomplished the one thing I want.

A MEMBER. How can the fertility of our farms be best kept up?

MR. BROWN. I am of the opinion that the fertility of the farm can be kept up with clover, with the use of very little manure; and after an experience of twenty years, beginning on a farm that was very badly run down, and the fertility of the farm has been wonderfully increased in this way.

A MEMBER. He has told us what he raised from his ninety acres, but he did not tell us what it cost him to raise it.

MR. BROWN. My outlay for labor is about three hundred dollars per year; my hired man lives on the farm; my taxes are seventy dollars more and my blacksmith bills, etc., would run it up to about four hundred dollars per year.

A MEMBER. You said that the assessed value of your farm is \$4,000; what do you consider the actual value of your farm is?

MR. BROWN. I could have sold my farm for four thousand dollars, but I would not take six thousand dollars.

PRESIDENT SIBLEY. I think the last question that was asked the speaker is a very important one. Now, if Mr. Brown has a farm which is worth six thousand dollars he should, instead of charging six per cent interest on four or five thousand dollars, charge six per cent on six thousand; but while you are getting six per cent from your farm you are doing better than the majority of the farmers in this association. I can make six per cent in almost anything in which I put my money. I have made investments that did not require any great amount of skill, that gave me forty per cent.; and I hold to-day that a higher order of intellect is required, and a greater amount of persistence, and more hours of hard work are required to make a thousand dollars on the farm than there is to make fifty thousand in general business dealings. I have given years of thought to my farm, but I have never met with any great returns, and I know that it required more labor to make a thousand dollars on a farm than it did to make a thousand in general business.

I know an intelligent farmer, a man that has more than ordinary skill, and a man who, I believe, has been successful in his pursuits, and is considered to-day among our most successful men in farming. He told me that if he could get one dollar and fifty cents per day, he would have a greater income than he gets to-day from his farm. I am thankful to my Creator that I do not have to depend on farming for the support of myself and family.

MR. BROWN. I want to say to the gentleman that has just spoken, that I like always to have both sides brought out. The Lord did not make all men alike. When I find a man making money by managing a large business, as I find my friend here, then I agree that money comes hard on the farm. I am sorry that he said anything to discourage

the farmers, for the farmer is the bone and sinew of the country. The farmers are behind him, and let them become discouraged and he could not make anything in any other calling. I feel that the dollar that the farmer makes is worth fifty made in any other way.

Prof. ARMSBY to President SIBLEY. What proportion of the business men of this country, by working hard, have made over six per cent. on their investments?

President SIBLEY. Myself, for one, and every man that pays attention to business. I have men that came to me without a dollar, and by their own wages have paid for their homes and own them. I do not know what proportion. I know of a good example in Pittsburgh. A man was a clerk in a store in 1870; the man failed five or six years ago for five thousand dollars. He has since paid all of that, and is probably worth from five to ten thousand dollars to-day.

Mr. CROOKER. There is a good deal to think about. The question that Prof. Armsby asked is a practical one. An exception does not make the rule. Mr. Sibley has been giving us exceptions—certain men who have done certain things. I will take a little exception to one thing that Mr. Brown said. He said that farmers are the bone and sinew of the country. I have a colt that has more bone than I have and more sinew than I have; I think the farmers of this country are not only the bone and sinew but the brain. "Undoubtedly," he says, "a man can make more money in business than he can on the farm." Well, I should hate to start out to earn a farm at farming to-day. But at the same time, a man's success depends on two or three things; a man may have the ability, he may be placed in a position to make money and then fail, where a man with less ability may succeed. I do believe that the farm is the best place to bring up the children that we have. I have cared more for my farm life on account of my family, than anything connected with it. I believe that there is more contentment on the farm than in any other business. I would rather bring a boy up on the farm, even if he were to be put out as a merchant. The business man has to depend on others, he never knows how much he is worth he cannot sleep as well as the man on the farm. If a man has a farm and is out of debt he can feel safe, but if he is not out of debt he is in pretty bad shape to-day.

Mr. SHIPPEN. It seems to me that the majority of our farmers do not know what they do make upon their farms. Does farming pay? I should like to know how many farmers there are in Crawford county who keep accounts and do know what their farms make, and what they spend from their farms. Can any gentleman tell us what he spends for articles that he does not raise upon the farm, or tell us what it costs him for groceries? Now, when I was a boy, my mother gave me a little book and said, "I wish you would learn to keep accounts. Now if you get any money put that down in your book; and if you spend it, put that down, and what you spend it for, and then you will know whether you spend it foolishly or not." All through my life I have kept an account. Now, gentlemen, I have a farm; I hire men and pay them by the month. I furnish the provisions for the farm. I allow them to eat all the eggs and chickens they want, and to raise their own pork. I allow them to go to the store and buy what they want in the way of teas, rice, etc. I keep a strict account of what that costs me. They have coffee and tea three times a day. I allow them their sugar. I find it costs me one dollar and thirty cents per month for every man and woman on the farm.

Well, I was going to hire a man who had eight children. I was willing to board himself and wife and oldest daughter, but he had to pay for their tea and coffee. When we came to settle up he said "Mr. Shippen, I am not making money enough." I was paying himself and wife and boy wages, and I was allowing the one dollar and thirty cents, just the same as the other men got. He bought his flour, the flour came through the store; that was included in the one dollar and thirty cents. He said he was going behind. I told him that I could not buy my flour for one dollar and thirty cents. I told him that I would look his account up. I figured it up and he had expended about eighty-one cents a month for each individual. His children were counted in this way: One boy ten years old, a little girl eight years old, and some younger, and anything below ten years I counted two for one. I found that his expenditure for that year was but eighty-one cents per month. At all events, I hired another man on the same conditions; he worked for a year, then we figured up at the end of the year for articles purchased, including flour, rice, butter, salt, etc., and these goods only amounted to eighty-two and two-third cents per month. I know men that commenced with nothing and are now living very comfortably. I think the farmers are in a very good state. I don't think the farmers are going down hill. Now, Mr. Sibley talks about one of his workmen paying for a house. At one time I worked in a foundry and had eighty men who worked in the blacksmith shop. These men worked by the piece. I said to the foreman of the blacksmith shop, "We will have to get another man or these men will have to do a little more work." At the end of the month we settled up with them, and one of them was so elated that he must go off on a drunk. He was off for two weeks, finally came back, but we could not hire him, as we had another man in his place; but I gave him some work wheeling in some coal at a dollar a day. In a few days I noticed on the fence in great big letters "105" and on his wheel-barrow "105," and on the gate "105." I inquired of a boy we called Jimmy, "what does this '105' mean stuck up around here?" He said, "Do you not know, Mr. Shippen? That represents the amount of money this man made last month before running the wheelbarrow." Now, the other man that made his one hundred and five and dollars said, "Mr. Shippen, I have got four hundred and fifty dollars and I do not know what to do with it." I told him to buy a house. Now, gentlemen, it is what the farmers save, not what they make that counts. I hired a boy for ten dollars a month and board, and I found that he was spending eight dollars a month for cigars and tobacco; and how many farmers are doing the same thing?

A MEMBER. I did not understand the speaker that he took the keeping up of repairs into consideration. Men all seem to leave that out. It is supposed that it takes two per cent. to keep up the farm buildings. We do not hear anything of this. Now the material and farm products are coming down in price, material that we have to buy in repairs are going up in price. This is something that looks very strange to me. We are not receiving our just deserts.

MR. EDMUNDS. I find by Dunn's Agency that three-fourths of the business men are quoted at five thousand dollars or less. Now these men are worse off than most of the farmers. Look at things as Mr. Brown looks at them.

MR. JAMES. Two years ago I had a man who got his house, fuel and ninety dollars per month. His father-in law came down to visit him;

the old man owned a farm. He got uneasy and said to me, "It is time I was going home." I said, "Charley is glad to have you here," he said, "It costs Charley something to keep me and mother. He can come up and visit us and it will not cost anything." I asked him if he never gave his farm credit for this. "Oh, no," he said.

Now his son was getting ninety dollars per month and house rent, and because he had to buy most of the provisions, and because his father-in-law had a farm, he thought it would not cost his son anything to come up and visit him. Now, we do not look at this in the right light.

Mr. SIBLEY. I would, in connection with my side of the argument, like to read an extract. (Reading from *Pennsylvania Farmer*.) I have recently been told that the condition of these people (New England farmers) is most deplorable; and having visited them, and being somewhat familiar with the state of affairs of New England, I can say that the owners of as fine farms as there are in New England, would be glad to take forty dollars an acre for them.

Now, I am no politician, but I want to say a word about politics and politicians. Now, as far as I am concerned, as an individual, when a politician comes around I am going to ask him how he stands upon the question of agriculture. Gentlemen, we want to elect our senators as well as our congressmen; we want men to represent *us* in the legislature. Who have you been sending to your legislature and to your congress? You will have to send men whom you know; men who will pay some little attention to your demands. There were expended in the state, for our state militia, three hundred and ninety thousand dollars. There were expended for agriculture and educational means in the line of agriculture less than twenty thousand dollars; and in associations such as this, in which we have had teachers and experts to instruct us, we have tried to get an increase to the appropriation to the extent of two hundred and fifty dollars, that we might be able to get our reports in less than two years, but we must wait two years because it would cost two hundred and fifty dollars more. Now, the public have to wait two years to find out what has taken place here, and then it is two years old. The world is marching on and marching fast, yet we are obliged to wait two years for this information because the farmer has no voice in the legislature. I do beg of you, gentlemen, not to be so wrapped up in party. Do as the farmers of the west have done. Unite farmers, republicans, democrats and prohibitionists, and send your own representatives to your houses of assembly and your legislatures. Measures must be discussed. Now, I don't believe there would be any crime committed if the farmer should indulge in politics.

Mr. CULP. What is the reason that our farms are so depreciated in value? For the last ten years they have fallen off ten or twenty per cent. What is the cause?

Dr. FLOOD. Gentlemen, I sympathise with you farmers, because I am somewhat of a farmer myself. When I was a boy I worked four years on a farm; I earned my first money there. In my young years it was my desire to own a farm, so when I became a man I bought a farm. About two years ago or less, I was at my farm with some of my friends. One of the professors said to me "I want to know how much money you lose on this farm every year." We figured it up and made out that my farm cleared six hundred dollars a year. He said he did not believe it. My man was working on the other side of the field, and he said he would go over and take his statement. When he came back he

said, "You have got him trained, he says you clear eight hundred dollars on your farm." I believe I get more than eight hundred dollars from this farm. Now, if you will do as Mr. Edmunds says, take Dunn's Agency, and take the city of Meadville, and run down the list of business men, and take the town of Franklin, Oil City, and Titusville, you will be amazed to find that the business men in these towns are not as well off as the farmers of this country. Go through each town and city through the country and make a comparison, and I believe, to-day, that the farmers are in better circumstances than the men of business in the city. The average men of Titusville are better off than the men of Jamestown, N. Y. I have been told that one-half of the manufacturers of Jamestown are laden down with debt and mortgages. Now, if you talk about depression in farming and decrease of values in property and of land principally, you must apply the same rule to the business world. It is said that there is a greater depression in England than there is in this country. Now we have something to learn concerning farming in this country, and concerning the management of products of the farm.

The remarks of Mr. Sibley when he made the statement that the amount paid to the state militia was three hundred and ninety thousand dollars and that less than twenty thousand is expended by the state for the encouragement and developement of agriculture are astounding. I say it is an outrage—I say it as a republican. Reverse this, and then we will be on the right track. Expend twenty thousand dollars for the militia, and three hundred and ninety thousand dollars for the education of the agriculturist. But the voters are to blame for this. Tom Reed says the greatest hindrance to legislation is the ignorance of the people. Let us not stop with our party. We do not want it tolerated for another year. We must have more money for farmers' institutes, and dairy associations, for the education of our farmers and dairymen. Now, let us demand that if they are going to expend three hundred and ninety thousand dollars of our money on military organizations that we do not need (for we do not need a militia in Pennsylvania that will cost four thousand dollars a year) we ought to devise means, as we have already said, to secure a larger appropriation for holding farmer's institutes and dairy associations, and to organize in such a way as to increase the value of our land, and to make the farmers and dairymen the controlling power.

Mr. COCHRAN. Now, Mr. Sibley has precipitated this discussion, he has a right to talk to the farmers. We have an agricultural society in Franklin and we got into debt, but we had a man that did us a great deal of good, and that was Mr. Sibley here. He said, "I want to see what is in this thing I want you men to double the premiums at the next fair. I had expended thousands of dollars in establishing a stock farm here, I want to see if the people appreciate it. I want you to double the premium list." We said that we could not pay the premiums that we had offered. Said he, "It does not make any difference, you go ahead with it." And we had the greatest fair that was ever held in the county: and we had another fair and we got the people, and when it was over he did not run around and growl about it, but paid ten thousand dollars of the bills. Now, Mr. Sibley does not recommend you to abandon your farms, but to find out what is the matter and see that you have it in your own hands. Now, Mr. Sibley shows us that the farming business

must be elevated. Here is the chained elephant with three-fifths of the votes, now stand up and be counted.

The next to claim the attention of the convention was the address of Hon. Henry Talcott, of Ohio, on the subject—

HOW CAN WE IMPROVE THE DAIRY INDUSTRY?

Mr. Chairman and Fellow Citizens :

I am pleased to-day to be able to respond to the kind invitation, sent me by your committee. Last year, I was unable to do so, because of legal work connected with the execution of the pure food laws in Ohio. Nearly twenty years ago I visited this busy little city—the only time in my life—and I presume you will be at a loss to imagine how this could be—or how any one could so absent himself from the city of Meadville. Your modesty, however, in not presenting a map, showing it to be the exact center of the world, and also of the attractions sufficient to entitle it to the next world's fair, can be partially reconciled by the fact that it is truthfully and without boasting the great dairy center of your commonwealth. My former visit was to learn the workings of your Meadville Dairymen's Board of Trade, and to witness the actual performance of one of your great sale days.

I was well paid for my journey, for out of it grew large sales for the product of the factories. I was then selling for several different cheese factories in Ashtabula county and in addition to that it inspired the formation of the Western Reserve Board of Trade that did a grand work for fifty-four cheese factories in our county several years.

Let us (before we commence our subject) for a few moments compare the present situation with twenty years ago, or near the time of my former visit. If I remember correctly, at that time New York was the banner dairy state of the nation, Pennsylvania was second on the list, and Ohio third. These three states, at that time, produced probably three-fourths of all the dairy products placed upon the markets of the United States.

Our best market, for years before then, had been the great west and south. Cincinnati, Chicago and St Louis had been the centers of my shipping trade for cheese and butter many years when I was here before. How is it to-day? All changed. The transformation is wonderful. The iron horse that has developed the west and south, aided by the inventive genius of man, has most completely revolutionized both the production and the sale of the dairy products.

You who have lost your grip must be reconciled and resort to different methods to hold a place or endure the present.

To-day Iowa is the banner dairy state of the Union. In creamery work she has beat us blind. Minnesota, Illinois and Wisconsin also are ahead of Ohio, in fact Ohio now stands the tenth on the list, while Pennsylvania is fourth or fifth. The new cream separators have also made the industry successful in the south. Kentucky, Tennessee and Texas are rapidly coming to the front with creameries and cheese factories, in fact the new states, Washington, and the Dakotas, have engaged in the business and are pushing for success with commendable vigor. Thus we see our markets wrested from us by honest competition and supplied with home production.

Have we a right to complain? Can we face the situation, and by heroic reform in methods or economies hold the fort, or must we succumb to the Darwinian theory and leave none but the fittest to accept the field?

In addition to all this, God in his infinite wisdom has permitted the birth and full developement of Phil. Armour, bogus buttermaker, and for what reason this affliction has been visited upon the honest dairy industry the wisest of them are unable to fathom. We have it. It is a very prominent factor, and it plays its part with destruction to financial interests as well as human health and happiness.

How long, a forbearing and long-suffering people will permit this rank abomination to exist is hard to tell. It would seem that we were justified in invoking the aid of the Divine Master to undo and take back this wicked work. In our feeble attempts for this, we find the ill-gotten gold it makes subsidizes our press, our legislators, our chemists our doctors, and in Ohio, it actually operates successfully to close the mouths of the clergy or make some of them open advocates.

What can we do to better the result? If you will follow me to-day in a line of thought I will attempt to suggest a few opportunities open to us for relief.

You have never occupied the high position in your profession that it is possible for you to attain, I know it and so do you;

There are three special objective points to be gained by the dairy, three distinct aims to be accomplished and neither of the three will permit successful combination in this day and age.

You must work devotedly for either milk, butter or cheese. You must do it systematically, perseveringly, and with a stubborn will to conquer all obstacles, but you cannot combine all three of these things in anyone dairy or upon anyone farm, and produce either the highest excellence or greatest success.

Let us give consideration, for a few moments, to these three interests, separately. Review the present situation and, if possible, discover where we may improve. Take milk for the first, because it is natural. What are the necessary requirements for greatest success in this branch of dairy farming? One important item is to first have an excellent market for the product. If you are located near some large village or city, or situated on some line of railroad where it is possible to secure transportation of the milk so cheaply that you can hold your place with others in competition and have a reasonable margin from its sale, after deducting expense, to fairly and profitably warrant you in divoting your life and energies to this field of labor on the farm, we advise, then, to go in with all your might, your muscle and brain.

You must choose the breed of cows for this great work that will give the greatest performance at the pail in pounds, or quarts, or rather gallons, for a given amount of food. And, my friends, it is an open question what that breed is to-day. I am sorry the word of man is not equal in truth to the word of God, and, for this reason, breeders of cattle are a doubtful source for knowledge. You must watch, at least, (if you do not pray) the results of the different breeds of cattle, before you tie devotedly to any. You are justified in testing for yourself the different ones but you are dishonest with yourself and with your calling when you hold to the inferior. The day has come for you to produce the quantity or be forced down and out of the race in the milk department of the dairy. You must keep an exact account with every individual cow in your dairy to know whether she is a money maker or

a loser for you. I regret to say it, but it is the truth; I have visited hundreds of milk dairies, in the past three years, in the performance of my duties as one of the Dairy Commissioners of Ohio, and seen upon these farms as in the city stables, hundreds—yes thousands of cows, with so undeveloped udders or, reservoirs for the milk, that it would be utterly impossible for them to give a reasonable amount of milk for feed consumed, even should the cow attached to them be capable of producing it. What a stupid blunderhead of a farmer to keep such cows for the production of milk! What disgrace to the calling; what an accession to the bankrupt and mortgage list it makes! And the profession must bear the brand and stigma of defeat by just such incompetent farmers as this.

The wives and babies suffer for this incompetency. The farm suffers. Its appearance suffers from the waste of substance, so stupidly allowed; and the good reputation of dairy industry, state and national, also suffers.

Fellow citizens, this great fault is so prevalent all over these United States, that I wish I could burn this point of information into the hides or skulls of dairymen so deep they would, in future, give heed to the needed reform and then practice it.

Next to highest excellence of cows to produce the milk, comes feed and care to increase performance. Every farmer can have a good warm stable or barn for the winter work of the dairy. The poorer the man the better he can afford it, because its necessity and duty becomes imperative. These can be made cheaply when you sacrifice beauty that is of no great consequence.

You must double or ceil up the inside of your wooden barns with slabs, waste boards or good matched ceiling, and fill the space between outside and inside, if necessary to increase its warmth, with straw or leaves.

You must bank up your barns sufficient to prevent any cold air whistling under the stable floors and coming up through to freeze the cattle and rob them of the milk, they must use to heat their frosted bodies. Feed is fuel in winter months, and all you lack in warmth of stable must be supplied by feed and loss of milk. It is the most practical and successful plan for the average farmer to raise his own feed upon the farm and keep only stock sufficient to consume the same.

For the production of milk, the oat crop is a very important aid. Oats ground and mixed with wheat bran are excellent and within the reach of most farmers in the middle and northern states.

But ensilage, corn eusilage, is the sheet anchor of future dairy success for all this section of country. Those who have practiced it, for the last three to ten years, give such unmistakable evidence of its value that scientific and profound knowledge cannot stay its progress, or defeat its good results. Too much self-assumed knowledge, of the scientific order, is a hindrance, oftentimes, to the best practical results. This has been so manifestly true with regard to the silo, and its contents, that a letting down in veneration for these wise men, has unfortunately been forced upon us. To-day they wrestle with spontaneous combustion, dry and wet feed, analysis, food solids, and thousands of other fine-spun theories to increase consumption of time and business for the active brain, and hold a place for high salaries and the honorable emoluments of office.

But the ragged old farmer has but little time to listen to these fine songs. He is reaching out for more cloth to close up the door on the

back side and shut out the cold. He knows a few things himself. The only great trouble is to induce him to carry out the plans. He knows corn, oats and barley are good feed for stock. He also knows that beets, carrots and turnips will produce milk, and if his back ain't too long to stoop down and weed the crop and help to grow them by the quantity, in many places it will always be wise to raise them for this purpose. But the cheap wooden silo is now within the easy reach of every poor or practical farmer. He can grow the ensilage corn and produce the greatest amount of milk-producing food from this source for the least money of any crop.

That will produce equal results in the known world. An acre of good rich land will produce so much ensilage corn every year, that if you attempted to force it all through one old cow in a single year, it would burst the bag with milk and the body with volume of feed and ruin the whole concern. It is nearly enough for two and can be raised, secured, and properly prepared for ensilage food for a twenty dollar bill, and it ought to manufacture from eight to ten thousand pounds of milk, if it is worked up in a reasonably good old cow, suited to the work of a milk-producing dairy. But I will speak of the silo and its advantages hereafter. At this point it is a digression.

The special feeds and condiments, oil-cake, meal, and prepared stuffs that cost money and time to go after them—instead of labor to raise the feed upon the farm—are practical for city chaps, but suicide to grangers. We must grow the feed upon the farm ourselves or great results will be slow to come. And in doing this we should be sensible, practical and thorough business men, so far as the calling of agriculture is concerned. To insure success for the milk dairy, as I said at first, you must produce quantity without the aid of the pump. Bear in mind, when you resort to that, men of my persuasion will soon have uncomfortable acquaintance with you. It will be folly, for the short length of your natural life, to ever attempt to sell Jersey or Guernsey milk and have customers appreciate or pay justly for its extra cream value. To be successful you must produce the milk so thin and so nearly void of cream, that there is no possible chance for the second man to follow you in the work with adulteration and therefore commit a sin. You must attend to it so thoroughly that crime must end, and your pocketbooks grow fat, instead of t'other fellow's.

It is a very essential thing to take the best of care of the milk you ship to market. Great pains in this is well rewarded. Every vessel, you use in its handling should be scrupulously neat and clean, and the best are made of tin. They should never be used a second time without thorough scalding. A very recent case of milk poison, in Cleveland, Ohio, was developed from absolute nastiness in the care of milk. A city dealer would ship by railroad, carrying milk cans out into the country every day for an old farmer to fill at the depot with milk and have them returned on first train. This milk at last became so poisonous that fourteen families were very sick and near to death from vomiting. Of course, the doctors and the chemists went for the farmer first. They inspected his dairy, his milking, his utensils for its care and handling; and, as good luck would have it for the farmer, he was a model man and everything as complete and perfect as could be found. That was a stunner to science. A *beat*, they hate to acknowledge, but honesty compelled them to go back to the city and for the dealer next. There they found his milk can waiting at the city depot for return to secure more milk, and upon looking into it they discovered a thick, dirty, black

sediment nearly one inch thick in the bottom of the can. Upon returning it to him, the nasty skunk owned up he had never washed or scalded it a single time this summer. The germs of tyrotoxicon had so developed in this mass of filth, that it imparted them to the new, sweet milk, every day, sufficient to cause this great calamity and trifling with the chances for disease and death. Upon its careful evaporation with ether, those ugly, sharp, and ragged germs, fully one-eighth to three-eighths of an inch in length could be plainly seen by the naked eye. It was my greatest wonder, when looking at them through a magnifying glass, how any human stomach could receive them and still sustain life. It is needless to state to you that this dirty milk-man's vocation in that city has come to an end, but it taught others a wholesome lesson, so was not altogether without good.

The breed of cattle being improved, the warm barns and proper feed secured, the handling and care of milk made perfect, you must add regularity and gentleness by milkers. No worry, no disturbance no annoyance should disturb the cow when you draw upon her bank for your deposit. You should avoid change of milkers. You should have an exact time and place to perform the operation, and you should give to each cow her regular turn. They will then expect it, then be ready, and if you are skilled at the business the yield of milk will reach all your reasonable expectations, according to the standard of perfection you may have adopted. The lesson I attempt to impress with this is, if twenty dollars worth of feed can produce four thousand quarts of milk, or one thousand gallons, had you not better change your cow machines and feed supply, and ride with us on the swifter car of successful progression, than to be longer groping along the wayside with three thousand pound cows per year, fed on pasture and dry feed at a cost of thirty or forty dollars per year apiece? Can't you improve a little? if not, I certainly have got into a very perfect locality and for my own benefit it will require a longer stay than I had planned to be with you.

Second, if cheese manufacture is to be the aim, a little different attention and method of work is actually necessary for the best of success, but not so violent or great, between the interests of milk producing and cheese, as they both are, when compared with butter.

To improve the cheese industry, heroic reform is needed and, first of all, comes the necessity of a better and more uniformly good quality. We have debased our goods so shamefully for the past five or ten years that we have nearly sickened consumers of its use. Its general use as food, even in our own country, cannot be truthfully asserted. Much less can the poor, vile stuff be palmed off on other nations. We do make a majority of cheese as near perfection as necessary for taste, for healthfulness, or profit, but the vast amount of indigestible *hard, white-oak* skimmed milk cheese and filled cheese that is suffered to be made and then go upon the markets on an even basis with other kinds gets it upon the tables of consumers fraudulently: and its disgusting worthlessness sickens them so completely of cheese that they drop it from the bill of fare entirely and cease to use it.

This great error must be rectified in order to place this important industry upon the plane it justly merits.

Cheese, when properly made and composed of fully thirty-five to forty per cent. of butter fat, is one of the most digestible, nutritious, and economical articles of food that can be used by man; but to make it void of butter fat, it is then almost absolutely indigestible and totally unfit

for man or animal food. This reform must come or cheese manufacture is utterly ruined. The Ohio dairy law is sadly at fault upon this point and I hope our present general assembly will give it a little attention. Cheese that does not possess at least twenty-five per cent. of butter fat, should be branded outside *and in*—vile skimmed. Self-interest of manufacturers should stop this stupid blunder without the aid of law, but it does not nor will it in future, is the best of my belief. With full cream cheese, or nearly that, so it shall have at least thirty-five to forty per cent. of butter fat, a taste and demand for it can be secured; our home markets would be grand consumers and would increase the volume wonderfully. The industry would then advance, but the reform should be national. Isolated spots of purity would do no great general good, except it would fit its devotees for easier entrance into Peter's Golden Gate. We should all rise up and stamp out the white-oak cheese and viler filled cheese.

Cheese factories should fairly and honestly decide upon the merits of the different races or breeds of cattle for the production of cheese and give to the public, or the farmers especially, the true result. It should not be a forced conclusion but a straight-forward every day performance. I have never yet been able to get a good square test of the value of Holstein Freisian milk for cheese, either officially or by call, from our Ohio State Board of Agriculture, and with so high claims it is an unaccountable mistake on the part of those breeders. Ayershire cows have made the first premium cheese of Ohio for many years; but that does not settle the question in their favor by any means. Milk, rich in casine as well as fairly charged with butter fat, is most desirable for cheese. We all know there are sometimes *spots* in common cross bred cattle that produce wonders, but their prepotency to stamp their get with equal superiority seems to be wanting, and as a rule should be saved only for their individual merit. A cow that will not produce at least five thousand pounds of milk each season for cheese factory work is a very poor investment for the farmer. If she has come to maturity.

It is a fearful mistake for any farmer to keep a dairy cow that will not pay him a good price for feed consumed, simply to add numbers to his herd. The bad effect would be no greater to keep hired men to steal nickles out of his purse daily. In short, we must exercise common business sagacity in the selection of our cheese dairy cows and then give liberal food, the same as heretofore described, for the production of milk. The farmer has then done his part well. I would advocate the skimming of milk for cheese to be done only at the factory and then to be so slight as to save only what might be wasted in the whey tank.

The new enemy to good cheese, however, is the cream separator; and Cunning Sinful Man, of Little Falls, N. Y., is out very recently with an infamous set of instructions for the manufacture of enriched cheese. Enriched cheese the prince of oleomargarine.

It consists of the use of the cream separator he desires to sell, and with it strip the milk of every particle of pure, sweet cream and make a gilt edge quality of creamery butter. Then supply this perfectly skimmed milk with butter oil made from cheap, rotten, rancid butter procured from the cast off refuse of market, and treated (as it must be) exactly by the same process as, is the renovation of filthy and doubtful fats for oil that forms the base of oleomargarine or common, commercial, snow white, city-rendered lard. This clever trick, if allowed to continue, will furnish the coffin-lid to bury the industry so deep that Gabriel's

trumpet will never resurrect it, and the quality of it be so disgusting that even skippers would loathe it.

The subject has attracted so much attention among dealers that we shall be obliged to meet the issue with strong measures.

As a sample of the interest which attaches to it I quote the following letter, which was recently received at the office of the State Dairy and Food Commissioner, of the State of Ohio.

NEW YORK, February 14, 1890.

HON. HENRY TALCOTT, *Dairy Commissioner, Jefferson, Ohio :*

DEAR SIR: The enclosed clipping from the *Daily Bulletin* will explain my reason for requesting answers to the following questions. Does the law in your state prohibit the manufacture of "filled cheese" when the said filling is butter? If not, must the cheese so filled be branded? Do you favor a national law on filled cheese similar to the present law on oleomargarine? If you will kindly reply at your earliest convenience, you will confer a favor and greatly oblige the committee on cheese of the produce exchange, who have charge of this correspondence and desire to make a report.

Yours truly,
M. FOLSOM,
Chairman.

There have for some time been complaints received by exporters of cheese, that the reputation of American cheese in England is being injured very seriously by the exportation from the United States of "filled" cheese. "Filled" cheese, it should be explained, occupies about the same position to pure cheese that oleomargarine does to pure butter. It is a compound of skim milk and grease, such as old butter, oleomargarine or lard. Old butter, it is said, is at present the principal ingredient, as the manufacturers, by using this, believe they can thus defy the analyst.

The cheese committee of the produce exchange held a special meeting in regard to the subject yesterday, Mr. M. Folsom, the chairman presiding. Mr. Folsom stated that he had already drawn the attention of the State Dairy Commission to the matter, and that it was the duty of the committee to do its utmost to stamp out the manufacture of this filled cheese, which, he urged, was not only unwholesome, but brought American cheese into disrepute in the foreign markets.

The following correspondence in regard to the subject was then read:

THE LIVERPOOL PROVISION TRADE ASSOCIATION
AND EXCHANGE COMPANY, LIMITED,
LIVERPOOL, January 8, 1890.

DEAR SIR: The directors of the association respectfully wish to draw the attention of your government to the exportation from the United States to the United Kingdom of what is termed "filled cheese."

This article is a compound of skim milk and grease, such as old butter, oleomargarine, or lard; the favorite ingredient being at present stale butter, on account of the belief of the manufacturers that they can thus defy the analyst.

Our directors believe that this product is exceedingly harmful to the dairy farmers of your country. It is not the natural product of the cow known as cheese. It is a well-known fact that for the past five years, since this fraud has been practiced, the price of pure cheese, instead of advancing in the spring months, has steadily declined.

This product is neither wholesome nor palatable, but is injurious to the American cheese trade, as it curtails consumption of the pure article, disgusting the community with American cheese as an article of food.

We believe the true remedy lies in prohibiting the production of filled cheese, which is manufactured in the western states; chiefly in Ohio, Illinois and Wisconsin. We are informed that New York State has prohibited its production.

We ask your assistance in this matter, and trust you will not only put the matter in the hands of the government, but suggest that they draw the attention of the dairy associations and Governors of the various states where this article is produced.

Your obedient servant,
J. L. HARMOND BANNER,
Secretary.

UNITED STATES CONSULATE,
LIVERPOOL, January 13, 1890.

HON. WILLIAM F. WHARTON,

Assistant Secretary of State, Washington, D. C. :

SIR: At the request of the Liverpool Provision Trade Association and Exchange Company (Limited), I forward herein for your consideration a copy of a letter addressed to me by its secretary inviting attention to the exportation from the United States to the United Kingdom of "filled cheese," an article compounded of inferior materials, and believed to be harmful to consumers and to the interest of honest dairy farmers in the United States.

The association is informed that in New York the production of this article is prohibited, and asks that the attention of the general government and of the governments of other states may be called to the matter.

I am, sir, your obedient servant,

THOMAS H. SHERMAN,
Consul.

DEPARTMENT OF STATE,
WASHINGTON, February 1, 1890.

The Honorable the Secretary of the Treasury :

SIR: I have the honor to transmit herewith enclosed copy of a dispatch from the consul at Liverpool transmitting copy of a letter from the Liverpool Provision Trade Association and Exchange Company, relating to the exportation from the United States to the United Kingdom of "filled cheese."

I have the honor to be, sir,

Your obedient servant,

JAMES G. BLAINE.
TREASURY DEPARTMENT, OFFICE OF THE SECRETARY,
WASHINGTON, D. C., February 6, 1890.

Collector of Customs, New York, N. Y. :

SIR:—I transmit herewith copy of a letter dated the 1st instant from the Honorable the Secretary of State and of its enclosed dispatch, No. 61, dated the 13th ultimo, and accompanying letter from the United States Consul at Liverpool, in relation to the exportation from the United States to the United Kingdom of so-called "filled cheese," an article compounded of inferior materials and believed to be harmful to consumers and to the interests of honest dairy farmers in the United States.

It is suggested that you place the enclosed papers before the proper officers of the Produce Exchange at New York for their information. Copies of the papers have been transmitted to the Honorable the Secretary of Agriculture.

Respectfully yours,

GEO. S. BATCHELLER,
Acting Secretary.

CUSTOM HOUSE, NEW YORK CITY,
COLLECTOR'S OFFICE, February 7, 1890.

CHAS. C. BURKE, Esq.,

President New York Produce Exchange, New York City :

SIR: I transmit herewith a copy of a letter this day received by the collector from the Secretary of the Treasury, together with copies of a letter from the Honorable the Secretary of State, and of its enclosures from the United States consul at Liverpool, which the collector is requested to submit for the consideration of your exchange.

Respectfully yours,

CHAS. P. MCCLELLAND,
Special Deputy Collector.

On motion a sub-committee, composed of Messrs. M. Folsom, T. Bamber and W. E. Smith, was appointed to make a thorough investigation in regard to the matter, and to report to the full cheese committee as soon as possible. The meeting then adjourned.

I hope that the author of this infamous fraud (filled cheese) will receive the brand of condemnation from every honest man.

You cannot have the quality of the stock too nice or too pure for the best results in cheese. And the tyrotoxicon of cheese is unquestionably the outgrowth of nastiness during some part of the process, either by the farmer's care of the milk, or more rationally, the fault of the factory.

It is a fearful scare, and but very few more cases, such as we have had in Seneca county, Ohio, this last year, will forever spoil the market for this article of human food. Cleanliness, purity and perfect work are needed all along the line, and when coupled with economical feed and the best of cows for this special purpose, the industry will advance.

Buttermaking is a problem that to day is puzzling the best of minds. Science, invention, and cussedness are all taking a hand and out of this contribution amazement and surprises are of almost daily occurrence. I cannot advise the too speedy adoption of every new invention or suggestion of science, nor do I admire the ready riders of any slab of public opinion to float on the butter sea of troubled waters in order to gain notoriety, or show quickness of comprehension almost equal to the departure itself. I feel that more conservatism, especially on the part of the farmer, is a much the surer and safer plan. Prove all things by careful and cautious experiment, honestly and fairly before you advise or adopt.

The new sweet cream butter, made by the latest improvement of the centrifugal, may be a blessing but its true value is yet to be established.

If the expense of its production is no greater than the deep setting of milk in cold weather on ice water, or if the machine and the necessary haul of the entire milk product to one common center, combined, does not cost more than the haul for cream alone and the deep setting of milk and churning by the creamery, it may be wisdom to adopt it. The haul of the skimmed milk back to the farm, or the butter milk, if that is the form, will then have to be compared with the worth of perfectly sweet, cold, skimmed-milk, the result of deep setting.

It is possible this new invention may be a grand and useful one for the southern states or warmer climates where cold setting of milk cannot be had. And still it may be a very impracticable thing for northern or middle states. I feel that it is best to go slow in either praise or condemnation until it proves its place and merit.

However this may be, it is beyond the reach of the common farmer, and the great dairy industry of butter making must receive other consideration than this. For its base, the best breeds of butter cows are imperative and the industry will not admit of vacillation, that is, you cannot blow hot and cold all at the same time, with good results. You must not expect to send milk to a cheese factory one week, sell milk to a city or village trade another, and then make butter when you can do no better, or as a last resort, and hope for riches or success in his branch of the dairy. It should be the most careful and painstaking care of all. Every move should look to endurance and the lifework of the farm. Unquestionably the Guernsey and Jersey tribes are the superior for butter and of these there is a wonderful difference. A cow with no great merit, but a pedigree, is of no earthly account to a dairy farmer. They are not actually worth seventy-five cents per dozen to him for butter-making purposes, unless they shell down the milk and cream sufficient every day to make them more than self-sustaining on the farm. I have seen thousands of high-toned Jerseys and Guernseys with little pinched-up udders no bigger than your two fists, almost no capacity whatever to store or take care of a decent flow of milk either night or morning, and then sell their pedigree for an extraordinary price, and throw the animal in, when the parchment would contain nearly the same amount of moisture that would the cow. While I do not wish to belittle or to strike down the family record of superior tribes of cattle, I do wish to impress upon you that pedigree is not the great essential for the butter dairy. The cow that will give you the greatest continued flow of milk, rich in butter fat, or that will make three hundred pounds of butter per year, or more, is the kind for you to raise upon the farm or buy. All such cows have good, large, nice, well-developed udders, and they show unmistakable evidence of superior

worth, so do not go wild in the purchase of butter cows and rely upon the name merely; for every common dairy of graded cows will have its old brindle or crumpled horn that can beat the delicate little pinched up good-for-nothing Jersey fluid; the good, superior, dairy cows are always well developed, you cannot mistake them if you will use reasonable caution. Raise them and no others upon the farm, when you have proved the young heifers, if they are found wanting in excellence and will not make at least one pound of butter per day, strike them from the list and feed them no longer than to fit them for the butcher's block. Don't be mean enough to sell them to anyone, not even a lawyer, giving the world a chance to hear a lie about their performance, but with highest excellence of cows for butter you can make money on the farm with the present extremely low prices paid for genuine butter, providing you will do other things correspondingly correct. If you are so situated that you can sell the cream from the cold setting of milk direct to a creamery, or if you can send to a creamery on the coöperative plan, it is, as a rule, the best thing you can do with the product, because the average higher price paid for creamery butter will fairly pay the creamery managers for the gathering of the cream, the manufacture and sale of the product and net the farmer more for his cream unchurned than he could possibly get for it after he has made it into butter. Of course there are exceptions to this rule where acquaintance with a city or village market or individual will gain you a larger price than the regular trade. Then in a few such cases a departure is warranted, providing the cost of delivery and collection of pay does not consume all or more than the margin. Creameries and cheese-factories need no great amount of advice to improve their work. All are alive and fully abreast of the times, but the millions of pounds of poor, worthless, store butter calls in thunder tones for great reform. Successful butter-making can never be done on the farm if allowed to be only a chance production. It must have regular and careful attention and a strict compliance with all the best known rules of its manufacture. It would not seem to me wise for you to attempt to make sweet cream butter on the farm, as lately advised by some of our scientific men, or as must be done with the new butter machines.

Education of taste must undergo a radical change or the good keeping quality of butter cease to be an important factor, therefore, cream at the farm dairy should be carefully stored in clean places. Where several messes of different ages are mixed together, the whole should be stirred frequently, while ripening, or putting on the necessary slight acidity known as the ripening process. Do not wait until it becomes so very sour that it is bitter, or too thick and heavy. When it commences to thicken slightly, it is ripe for the churn. This churning of butter should end when it comes into the granular state. The buttermilk should then be removed and good cold water supplied in its place to wash the little butter pellets free from buttermilk. At the second washing it will be completely done, and if allowed to stand in the cold water until it becomes quite hard, all that is left of buttermaking, is to take the butter out of the churn.

Drain off the water, weigh it and press into it, with as little wiping motion as possible, one ounce of good dairy salt for each pound of butter. Pack it away, if you are ever to do it, or ball it while in this condition and you will have the most perfect butter that can be made. Second workings are needless, you injure the grain of butter by extra working. You injure its flavor by every movement or need-

less exposure to the air. Get it in the market as soon as possible, and also into the stomachs of consumers, and the success is then complete. The time has now come when winter dairying can be made most profitable; the trade demands fresh butter and the far west supplies it. Our chance to hold summer butter for high winter prices is fast going overboard. You must right-about face and have your cows come in fresh, in October, November and December; work for that change.

Then chink up the old cold barns and make them warm and comfortable; keep your milch cows in doors most all the time. Build cheap wooden silos. To do this use only one thickness of planed and matched ceiling, none of it over four inches wide, and you will then be in condition to save a good crop of ensilage corn and make the most of its food value.

I must emphasize the using of only one thickness of ceiling very strongly, because other teachers fill the press and rostrum with different information. They say, use two thicknesses of ceiling with tarred paper or, at least, building paper between them. I tell you to do no such thing. Omit that expense and its consequent loss. No amount of argument or prayer will stop the decay of lumber when you put two boards together with wet between them. It hastens decay. You might as sensibly talk of having two thicknesses of staves to a cider barrel or water tank, one thickness will swell up tight as a water cask in a few moments after the wet ensilage is put into it, and it is then both air and water tight, and what more can you ask or expect?

As soon as you empty the pit, the lumber dries out perfectly; no decay, because air comes to both sides of it and the wood will last many more years on this account, alone. There is scarcely a farmer, within hearing of my voice to-day, who has not mechanical ingenuity enough about him to build a cheap wooden silo in the barn.

A few words for the cultivation of the ensilage corn crop. I advise the raising of the large variety of Southern white corn for this use, because it produces a greater amount of fodder than can be grown in any other manner so cheaply. Do not make a mistake by planting this too thickly. Make the rows at least three and one-half feet apart and, if you put it in hills, check-row it three and one-half feet, or, if in drills, three and one-half feet between the rows, and kernels from eight to twelve inches apart. Nearly every stalk will then produce an ear of corn, and it will usually grow fully one hundred bushels of ears per acre.

The value of this fodder increases as it approaches maturity. The longer you let it grow, the more mature the corn will get and the greater the development of saccharine matter in the stalk. The stalk is the main receptacle of all its feed virtue. The leaves are of but little account. They serve only to gather sweetness from the air during the day and deposit it in the parent stalk at night. If you crush them at night and save the juice you will find some saccharine matter, but if you do the same thing early in the morning there will be scarcely a trace of it. So don't tremble in your boots if Jack Frost comes early and whitens the leaves, you still have almost all the goodness left, unless it is followed quickly by a succession of hard freezes, so much so that it spoils the ear corn.

The Southern white corn will never grow to full maturity here but it will reach the good roasting ear stage and will make excellent food. It is a sufficient gain ration and makes perfect food, when thinly planted as I advise. My four years' experience with the silo and this same

crop I advise, make me entirely confident that what I say is true, and that you will live to thank me many times if I induce you to embark in the silo and butter dairy business, providing you attend to this business complete, which I have necessarily so briefly stated in all its different parts; I know you will again make money with the dairy.

But, after having done your part thoroughly and well as a farmer in regard to this business, there still remains a very important work to do.

You must join the grand army of reformers to help put down and out the fraudulent dairy goods put upon sale in almost every state.

These prohibitory laws should be national. But better state than none at all. The disgusting and unwholesome bogus butter is an insult to our intelligence as a people. It is a crime in every aspect of the case and a righteous punishment should be inflicted speedily, so as to wipe it and its manufacturers out of existence and so end this exhibition of human meanness. Fellow citizens, I did not come here with even a hope of telling you a thing you did not know, but it was my purpose to stir you up to the point of doing it. Men with profound knowledge will not always perform the simplest duties of life, like shutting the door or hanging up the boot jack, until told to do so by a child, when they will obey with alacrity. They know enough to do it but wait to be told, and that is what I came here to do.

WEDNESDAY AFTERNOON SESSION.

Prof. Geo. L. Holter, assistant chemist of the Pennsylvania Experiment Station, opened the afternoon session with a practical lecture on the subject

MILK ANALYSIS.

Mr. Chairman and Gentlemen: I have been requested to come up here to show this convention a practical test of the Short's method of milk analysis. I did not come here to say that Short's method is better than some other methods, but I have come here to tell you of what I have done, and what I can do, in the way of milk analysis by Short's and another equally good method. I could have written an essay, and I could have come before you and spent an hour in reading it, but you want something more practical than that. I am not, myself, a chemist. I have been working on the practical side of chemistry, and think, with your close attention, I shall be able to give you some practical work that can be fully understood.

We have used both the Short, and the Cochran methods of milk analysis at the Station. There is no doubt that the Cochran method is practically correct. I will not consume time in discussing the relative merits of the two methods, but will say that, while by Cochran's method the test can be made in a half hour, Mr. Cochran advises to have it boiled for two hours, then add the acid and boil for another hour; add water, and let stand for an hour for it to rise. We would get but little difference between the two methods, but we have found that we can do some better than that. The milk is first put into a tube holding twenty cubic centimeters. It is then emptied into other glass tubes holding double the capacity. The milk should then be heated up to

sixty or seventy degrees, then the alkali should be added. Use in adding the alkali ten cubic centimeters. (It is necessary to measure the alkali accurately). In handling be careful not to get the milk up on the sides of the tubes, so as to interfere with getting a perfect result. Now this is the first in the Short's milk analysis. The milk being slightly agitated is put into the boiler ready to boil.

In taking up Cochran's method I said that it was nearly the same, the same principles being involved in Cochran's as in Short's, but the method is a little different, though practically the same.

Instead of using twenty centimeters of milk I use but five in Cochran's. I use four tubes, placing in each tube five centimeters of milk.

Mr. Brown, from Ohio, wished to know why he used four tubes. Mr. Holter replied that it was for the purpose of arriving at a more accurate result by taking the average. After filling the tubes with milk there was added acetic and sulphuric acid, the same thing is done with the Cochran apparatus; after it is boiled with the alkali for an hour there is added three centimeters of each, acetic and sulphuric acid.

A member wished to know if the acids were sold at drug stores. Mr. Holter answered by saying that he did not have any confidence in drug store acids, you have to pay three times as much at the drug store as elsewhere.

If you are going to use this method you will want a large amount of sulphuric and acetic acid, and I would advise you to get them where you will be sure of their purity. We get our acids from New York. There has been a good deal said about Short's cheap alkali, but we have never used any of it.

A MEMBER. What is the cost of the apparatus.

Prof. HOLTER. The Short's apparatus will cost about fourteen or eighteen dollars, while Cochran's depends upon the number of tubes; one with twelve tubes will cost about twenty-five dollars. I am not here to advocate any particular method. The results which I have been obtaining compare favorably with the gravimetric analysis, and the gravimetric is calculated to be absolutely correct. In comparing the Short and Cochran methods with the gravimetric it was found that the average variation was within one-tenth per cent. The difference between the gravimetric and Short's was on an average of eleven one-hundredths; Short's giving that much more fat than the others.

I will say that when I began to use Short's method I read it a little too high; there is a tendency to read a little higher than you should. Some of the results that I have are as follows:—Cochran's, 4:33; Short's, 4:38; Gravimetric, 4:40, 4:58, making an average of two and one-half per cent. difference. I do not know how close you want to read your milk; we always work within one-tenth.

Reading from reports shows a difference of eleven one-hundredth per cent. Short's giving eleven one-hundredth per cent. higher. The paper showed eighteen one-hundredth per cent. to be the greatest difference.

Following are the tests of one cow: 4-7, 4-7, 3-8, 3-87, 3-75.

I do the work in duplicate form and give you the average in duplicate form. As I must go below to see how the milk is getting along, you may occupy the time.

Mr. BOLE. Brother farmers, I have been seriously impressed with Brother Sibley's remarks. I have been thinking about this for a number of years. Among our speakers we have heard this forenoon, not one of them has helped us out of our financial trouble, and I would

not try to help you out. Now, if the farmers are protected as well as some other parts of the people, they will take care of themselves. Take the farmer and put him on a basis with other men and he would get along. If we could buy the goods to-day that we need at twenty-seven per cent. reduction, we could stand the low prices.

Prof. HOLTER. (Returning.) After the Cochran experiment has been boiling about twenty minutes I would add to each tube about four centimeters of ether.

A MEMBER. Why do you add the ether?

Prof. HOLTER. It is simply to aid in getting the milk to the top. I add the sulphuric acid and the acetic acid to break up the casine in the milk and to separate the fat. I simply add the ether to separate the fat from the casine. Now this has been boiling something over twenty-five minutes; I will boil it twenty to twenty-five minutes longer; cool it and add the ether and hot water.

In the absence of Prof. Holter, Mr. James, in reply to Mr. Bole's remarks, said that the manufacturers were selling as cheaply as they could, and in order to sell twenty-seven per cent. cheaper, would have to cut down on their wages.

Mr. BOLE. As the gentleman directed his remarks to me, I will state that the average price paid by farmers to their hands, is from eight to twelve dollars a month; and this only about eight months out of a year. Now, as I hinted before, there is no one here to help us out. Dr. Flood told us that we were doing well. I agree with him in part, but I do not agree with him in all; but he did not help us out. Now, these are particular questions and it takes a better financier than I am to help you out. It is my opinion that the farmer would take care of himself if he had a proper chance.

Mr. EDMUNDS, of New York. If you will send your farmers up into our country we will show them how to take care of themselves. Now, when I start out to hire a man, I want the best that I can get. Your twelve dollar men will ruin you and will not be looking after your interests; they are not taking proper care of your cows; you cannot hire brains for twelve dollars a month.

Dr. FLOOD. It depends on how much profit a man expects to get out of his business. It depends on whether he wants a twelve dollar man to do a seventy-five dollar man's work. Poor pay and poor work. A man who can do the work will always command a high price, and a man who has it in him will in the end command a high price.

It has been said here that the farmer does not have to work much in the winter; now, if they would work as hard in the winter as they do in the summer, they would make something. The manufacturers work twelve months in the year, and yet the manufacturer and retail dealers and traders of this country, I believe, to-day, are laden down with debt more than the farmers are. Mr Sibley said that the farmers are not making as much money as they should; that they are not making as great a success out of the dairy business as they should make. First show the fault, and then the remedy. I do not attempt to help you out of the rut. Now, when a man hires another man on the farm, and pays him twelve dollars and board, the fact is his board costs more than his work, and he gets his house-rent. The mechanic must pay all his expenses, and a man who works on the farm for twelve dollars a month, can save more money than a man in the city who gets fifty dollars a month.

Mr. EDMUNDS. Do these men work the year round, or eight months, or seven months, or six months?

Dr. FLOOD. I should not think a man would do that. I say here to-day that the man that gets the most money out of me, is the man that I employ on my farm. I worked on the farm for four dollars a month for the first two years, and five dollars for the next two years. I contend that the farmer has a better lot than the mechanic, if you compare the mechanic to the farmer.

Prof. HOLTER returns. I am through with the first period of Short's method. In other words I have been making soap. Next I will add sulphuric acid to decompose the soap, by that time the Cochran experiment will be complete. This is to be added slowly; you have to let the tubes cool. I add ten cubic centimeters of sulphuric acid. It does not make any difference how cool it gets. When it gets cool there will be a very heavy scum that you will have to break.

PRESIDENT. SIBLEY. Do you believe that every dairyman that is not making butter or sending milk to the factory ought to have some method of determining the value of his animals?

Prof. HOLTER. If I had a dairy I would not think of being without some method of testing my milk. If I were selling milk I would sell it by the Cochran method, but it is not so good for the buyer. A man should have some good means of determining the value of his milk.

A MEMBER. Does that test show the amount of butter that you get out of the milk?

Prof. HOLTER. Yes, sir; we get here about eighty-seven per cent of the butter fat. We have a table for calculating where the whole amount is made up.

Mr. EDMUNDS. Is there more justice in dividing money by the Short's method than by pooling the milk?

Prof. HOLTER. Yes, sir.

Mr. HUIDEKOPER. If the milk were taken to the creamery, would you get as much butter as is shown by your test?

Prof. HOLTER. No, sir, I think not.

A MEMBER. Is one hour's boiling as good as two?

Prof. HOLTER. I think two hours is a little too long to boil it. After adding the ether, to further the action, will let boil till the ether is all off, then I add to each tube a little water. If the work has been done properly and it has boiled enough, the fat will come up in the little tubes.

A MEMBER. Why do you add the water?

Prof. HOLTER. I add the water to bring the fat up into the graduated tubes. Now this is a little idea of my own. There might be a little fat in the water, so I take this piece of gum hose and blow the fat up into the graduated tubes. The test on two of the tubes is eleven, and on the other scant ten. Cochran's would give me not quite ten. This method of reading is very accurate. The milk in the first tube gives 38-100 per cent of fat, the other 36-100 per cent of fat. The result of a test made with Gravometric and Short's was: Gravometric 4 and 3-33; Short's, 4 and 3-34; Short's method always the highest. In some of my results Gravometric and the Short's differed anywhere between seven and fifteen one-hundredths, and eleven one-hundredth; Gravometric and Cochran differing anywhere between seven and nine.

The average difference between the two is one one-hundredth per cent.

The Cochran method now being complete, the following is the result of the test: 3.86, 3.92, 3.82. One of the tubes failed by boiling over.

Mr. EDMUNDS. What is the trouble when there is a black fluid in the tubes?

Prof. HOLTER. That is the casine; the boiling was not sufficient in the two hours. Instead of filling up the short tube immediately, I fill it partly up and let the casine and fat separate entirely, and the casine will be together, and the fat will be together.

A MEMBER. What kind of milk did Prof. Holter use?

Answer. The milk was from Mr. Huidekoper's Rhoebe H., No. 5223, Holstein herd-book. She is coming eight years old; had her last calf June first, 1889. She gave eighty nine pounds of milk in a day, in the flush of milk in 1889; and according to this test she would make twenty-four and ninty-two one-hundredth pounds of butter in the flush of milk. Ambro Watson made seventeen pounds and eleven ounces of butter from this cow in 1889.

A MEMBER. Will you not get more butter fat by this test than the churn will get out of the milk?

Prof. HOLTER. I think so.

Mr. EDMUNDS. It is impossible to get out all the butter when using the churn.

Prof. ARMSBY. When a man takes a lot of bullion to the mint to sell, he does not get his pay for the goods until it is found out how much gold is in it. The bullion is put through a certain process, by which the gold coin is gotten. Now, the manufacturer takes your milk and puts it through a certain process, and determines the value of it by the amount of fat it contains. I think from the results that have been obtained that these methods show very clearly how much fat is in the milk. Now, suppose the Short's method gives one eleven-hundredth or one twelve-hundredth too high, it will be true of every man's milk and the money will be divided equally. Now if you find that you are not getting out as much fat as the chemist says there should be, look around and see where that fat is going to. Now, a man who understands his business can take good milk and get out very nearly all the fat.

The amount he will leave in the buttermilk will be too small to mention. The cream should be churned before it is set. Failure to do this will allow some cream to run off in the butter milk, and you will say it is impossible to get out all the fat.

However, I consider the Short's test a reliable method of determining the amount of fat in a patron's milk, and a division of the avails on this basis will be eminently fair.

THE DAIRYMEN'S BANQUET.

One of the features of the dairymen's convention was the banquet of President Sibley. It will be noticed that the president's address gave no uncertain sound on the subject of the farmer's position in politics, and this outspoken position of the president of the association at the very beginning, was noted by some prominent members who held different opinions on the subjects discussed, and they took this occasion to strongly oppose Mr. Sibley's sentiments. Two hundred and fifty plates were laid and the fun began. Judge Church innocently discharged his wit in his choicest allusions, and left his audience in a pleasant mood. Dr. D. H. Wheeler, president of Allegheny College,

spoke eloquently of the necessity of keeping "at the head of the procession," and showed that the same elements of success which are necessary to other pursuits are equally necessary in farming. F. W. Edmunds, of Sherman, N. Y. added his contribution of sound sense to that which had preceded in a pleasant manner. Mr. Edmunds always commands attention and never fails to hit his point. Waldo F. Brown, of southern Ohio, has a style of his own which is always pleasing and instructive. He recited a Hoosier poem which put his audience in a sympathetic mood and the applause was hearty as he sat down. Hon. Henry Talcott, of Jefferson, Ohio, gave one of his characteristic addresses, full of practical points. He is enthusiastic for organization of farmers, and insisted that the grange is the best organization that we now have to meet the wants of the conservative class to which we belong.

Senator Delamater was next called upon and he responded readily and pleasantly to the call. He referred to his candidacy for office and declared that his welfare was dependent on the support of his neighbors while their welfare was dependent upon him.

Mr. John Fox was the only Crawford county farmer called upon. Mr. Fox did well in a few happy remarks, and Judge Henderson came down to the business part of the meeting. He proceeded to do this by declaring that the present lot of the farmer was the most happy and prosperous of any calling of life. He declared that the agricultural press were engaged in an effort to deceive and mislead the farmer. He declared that what the farmer needed was intelligence and enterprise in his work.

Mr. Sibley finally arose in defense of his former expressed sentiments, and with eloquence and force answered every argument of his opponents. The occasion was memorable, the scene inspiring. He grew more eloquent each moment and the applause more enthusiastic.

He declared that the farming class is the most conservative of all the classes of society. "Said he on them rest the protection and defense of the country, while protection is denied them. The burden of taxation rests upon them; they have asked for justice and fair treatment and been refused. The spirit of a just cause is rising. Gentlemen may cry "peace! peace!" but there is no peace. The farmers' wrongs call for settlement, and unless our legislators settle them quickly we will settle them."

This was addressed directly to Senator Delamater with impressive effect. Mr. Sibley defended his position with tact and eloquence. He was vociferously applauded by every farmer present and sat down at last amid a perfect torrent of cheers. It cannot be said that the banquet was barren either of interest or results. The greatest harmony ended the most interesting banquet ever held by the Pennsylvania State Dairymen's Association.

DR. FLOOD'S ADDRESS.

Mr. President, Ladies and Gentlemen: Mark Twain, when delivering a lecture, before he began, said: "The subject of my lecture is announced on the programme, "Babes in the Woods," and proceeded to deliver his lecture which was on an entirely different subject than the one announced on the programme. He closed by saying, "Now, ladies and gentlemen, this is my lecture on 'Babes in the Woods,'" and sat down. The title of my talk on the programme is "A Progressive Man."

I propose to give you a talk upon an entirely different subject.

Now, we discussed in this dairyman's association, yesterday and to-day, this question: Are the farmers growing poorer or richer? It seemed to be the universal verdict, as far as the speakers were concerned, to-day, that the farmers were not growing richer, but I think it was not decided that they were growing poorer.

The question raised in the discussion this afternoon was this: that the farmers of Pennsylvania (and a number of other states were mentioned) are not growing any richer, but poorer.

It is the custom for dairymen to devote a good deal of attention to the quality of butter and cheese made, to the kind of cows kept, and the feed given to them, but little has been said upon the subject of market for butter and cheese; about the buyers, and how the purchaser and producer shall be brought together.

Now, I am going to suggest a way to-night, by which farmers and dairy-farmers may succeed in reaching the market.

It makes no difference how good your products are; the butter may be gilt-edge, and the cheese the finest quality; a man may have the best cows, they may bring high prices (and we have some high-priced cows in the association), it makes no difference how good the butter and cheese are, if you have not some method of marketing your produce.

How can you find a market? How are we to find a market for the butter and cheese of Crawford county, or a market for the cows?

We have failed to make that point, and having failed to make that point, we have failed to reach success in dairying.

A man may make the best book that the world has ever seen, outside the Bible, but if that excellent book is not properly advertised, and if the proprietor does not send his book-agent to your door, it will not sell.

The book must be explained before its good qualities are discovered. Where is the dry-goods establishment? How are they going to succeed unless they use the newspaper to advertise their stock of goods? Where are the manufacturing establishments of New England? They send their agents out all over the land. Every week I find some man coming here from Philadelphia, New York, or some other city, to sell his goods in the line of my business, but have never found a farmer trying to sell his butter and cheese. Now, there is a lack at that point. Now, let us establish a Dairymen's Hall. Let us put it in the city of Meadville. Let us have a building that will cost \$10,000, into which each dairyman may bring the record of his best cow and the second best cow, and frame it and hang it upon the wall, and he could bring the record of his butter-making for a given week or month.

The fact is, your cows and butter will be in Dairymen's Hall of this city.

Let one hundred or five hundred of the dairymen of Crawford county come together and erect this hall, and bring a record of your butter and cheese making. You will find presently that the attention of men who buy butter in New York and Chicago will be turned this way, and their agents will be sent to this city and into Dairymen's Hall to look at the records made in the county, and they will soon find that this is the best place to buy butter and cheese.

Let us put into Dairymen's Hall an expert; a man who can analyze milk and cream; analyze butter and cheese; who will understand down to the last analysis the *good* qualities and the *bad* qualities of butter, milk, cream and cheese.

You can come from your homes here and have lectures and discussions on different topics all the year round, and you will have a man to talk to you on these things; he will be a man who is up to his work, and who will do his work with a view to building up the Dairymen's Hall in western Pennsylvania to a scientific stand-point.

Now, I leave it to any business man in this house if this is not a practical proposition. Now, if we are making butter and cheese on a small scale, and have but a small supply, we can generally sell it; but there is not a place where a large quantity of butter and cheese is being bought in this city.

And, therefore, I say that we should have such a place as Dairymen's Hall would be, and have a man at the head of it, who, when bad butter or cheese is brought will rule it out. Now, we want in this Dairymen's Hall an inspector for the purpose of inspecting your products.

Take Crawford county alone, and when spring opens we will have thirty-five cheese manufactories; four thousand or five thousand cows will supply the milk. Add to this list five thousand cows that furnish butter in Crawford county, and there is a large number that are used for milk and cream that are never used for butter and cheese. We have thirty-five factories and ten thousand cows. The butter will foot up over \$400,000 per year, and putting the cheese, and milk and cream that is sold with this, the dairy products of this county amount to \$1,000,000 a year. Is not that a business that needs looking after; that is worthy of careful attention? We want to carefully investigate it, and make it an industry which shall become an honor to this community, but we must find out how we can make better butter and cheese and then it can be done; and we must pay some attention to the buyer's side, so that they will look after us. I say that the business men and all classes of people in the city of Meadville can better afford to take \$10,000 and erect a dairyman's hall than they can afford to give five thousand dollars to any kind of a manufacturing establishment in this city.

City gentlemen, country men, and you as dairymen, we will put up money among ourselves and help build Dairymen's Hall. We will try this experiment, and I believe it will be a success. Now, to-day, we had a talk in this convention, and we were told that the state militia received \$390,000 per year, while the appropriation to agricultural interests was less than twenty thousand dollars out of the treasury. I said this morning that it ought to be reversed. We ought to have \$390,000 to invest in the development of the dairymen's interest and the agricultural interests of the state. Twenty thousand dollars is all that any state militia in this country needs.

Now the first thing we need is something from the legislature. We should have from five thousand to twenty-five thousand dollars a year. We are the greatest among all the sixty-four counties of our commonwealth. Now, let us organize and put it into the hands of a committee to go down to the legislature and ask that we may have ten thousand dollars to aid us in constructing Dairymen's Hall, and putting a scientist into Dairymen's Hall.

Now if we build this hall and put a scientist in it you will find that bogus butter will soon be discarded. To-day you will find plenty of men and women who think they are eating good butter when they are eating oleomargarine. Now, if this be done we will have butter and cheese put into the market that is of the best quality; and the result will be that the *purchaser* will be protected, and the *producer* will be protected.

Furthermore, I hold that we have in the city of Meadville enough banks, dry goods stores, groceries, drug stores, etc., to accommodate a community of twenty thousand people. The banks of this city belong to a great system of banks, and the same way with the dry goods stores. But the dairymen of this country are not organized in any such way. They have no head-quarters with no organization to reach the great centers of trade and population. Now, such is the condition of the dairying interests of Northwestern Pennsylvania.

Now, let the people come out and give a helping hand, that it may be set on its feet. A teachers' institute is held here, for one week, every year. The teachers gather here to the number of six or eight hundred.

They are instructed during the week by competent and thorough teachers and it is a magnificent organization under the direction of one man. He chooses the orators, who are paid, that the teachers may do better teaching in your schools.

Now, we are a little older, perhaps, than the children who are instructed in our schools; and we, as dairymen, should have something of the same nature.

Here we are, in the center of a large, growing industry, but we fail to comprehend the situation; or, if we do, we fail to take a practical course for solving the problem. Can we organize and erect in Meadville a Dairymen's Hall and keep in it a man to do the work for us? It can be done at a comparatively small cost. Now, there would be the central point where men from the east or west could consult the men of Crawford county; and Mr. L. C. Magaw tells us that even in Liverpool the mark of the United States cheese is asked for. We have a reputation abroad that may be largely increased if we will be wise and practical in our work.

Think for a moment of a thousand ships coming towards the eastern harbors of this country. They are laden with fruit from foreign countries to countries of the western world; and think for a moment if we had no harbor or custom-house, or no protection for these ships, how soon would we break up the commerce between this and foreign countries.

Take a great trunk line of railroads running from east to west, and no station where they may take passengers off or on, or leave express packages, or take express packages on; it would soon break up its business and directly it would be destruction to the corporation. We have no point of exchange here; every dairyman has to run out and sell his butter and cheese wherever he can find a customer.

When natural gas was discovered, gas was run into every city and town, and wherever their pipes ran through a town or city, there was established a central office, where people might come and buy their gas. I say that the dairy interests need Dairymen's Hall just as much as the ships need their port, or the railroads their stations, or the gas companies their offices.

We cannot expect to succeed till we concentrate and come to the same house and meet together and say to the dairymen, "Bring a good quality of butter and cheese, and we will build up a good market in this city." We will attract the buyers of this country; they will come to our market and when they find out that there is such a place as Dairymen's Hall there will be men sent here to buy your butter and cheese.

THURSDAY MORNING SESSION.

SILOS AND ENSILAGE.

By HON. HENRY TALCOTT, *Assistant Dairy Commissioner of Ohio.*

Mr Chairman and Fellow Citizens:

My stay here to-day, was unexpected, and it was not my intention to make any extended remarks upon the subject of silos or ensilage, as I had a contract with my neighbor, Mr. Gould, to let the subject alone. But, in the absence of Mr. Adams, who otherwise would have spoken on this subject, it seems necessary that some one should lead in this work. I expect to attend a national meeting of siloists in Cleveland, next week.

I have taken for my subject Silos and Ensilage.

One year ago I attended a silo convention in Cleveland, Ohio, and I was greatly surprised to witness the great interest manifested by progressive farmers, from the representatives there present of several different states, in the silo. I did not expect to see so many leave their homes, and bear the expense of attendance there and consequent loss of time. This year I expect to see, upon the 13th or 14th of March, an increased interest and a larger attendance.

Perhaps it may be accounted for, in part, by the frantic efforts necessary for farmers to make in order to hold a place in the great bread-and-butter struggle, or race of life. I was greatly interested in the meeting last year, because the majority of speakers, or advisers, were not influenced by any self-interest in the matter; consequently it was that honest advice, earnestly given for the best interests of all that might be influenced to action, which is so seldom obtained in this day and age.

When I listen to advice from a man on any given subject who has a private interest to serve, or an axe to grind, I go slow in swallowing all he may say. The meeting last year was so free from that influence I really enjoyed it very much and am happy to say it did bear good fruit, as I can testify from many reports of new silo converts and builders in 1889.

One more year's experience and rather extended observation over the north part of the State of Ohio, has convinced me it is my duty to go back again this year and confess mistakes and emphasize the still stronger opinion that the single thickness narrow planed and matched board ceiling will make the very best silo, all things considered, in existence.

Confession is good for the soul, and I have always felt that I had no business to neglect any tonic of this nature within my easy grasp.

A year ago at that meeting, I advised you all, I say you because I find the press had conveyed our proceedings, each year to fill an ensilage pit sufficiently full of green clover to bridge over the July, August and September drouth period of poor grasshopper pasture, in order that the great dairy interest should not suffer and the milk flow of our dairy cows be kept from unusual shrinkage. I believed in that advice. I thought and felt confident it was honestly and unselfishly given, and done for a wise and benevolent purpose. Acting upon this advice, June, 18, 1889, I started a mowing machine in a field of green clover, not all of it in full blossom, but within a week's time of its best

condition for clover hay. I caused a team to follow the mowing machine to haul this green; fresh clover to a silo pit and put it in as rapidly as possible, giving it no chance to dry. I told my hired man to tramp it as thoroughly as he could, especially around the sides of the pit, in order to have it pack together fairly, and become air tight. In this manner we harvested five acres of good, handsome clover, that a week later would have made fully ten tons of good cured hay, provided the hot sun and fair weather had been favorable for its securing. I filled a fifty-ton silo pit, fifteen feet square inside measure, and ten feet deep that, with finely cut corn ensilage, holds fully fifty tons. After we had got done, needing good weather, the hay and wheat harvest being made amidst showery weather and all those exasperating circumstances so necessary to establish firm christian character being entirely over, the expected hot sun and drouth did come, and that, too, with a vengeance. We suffered farther moral discipline in endeavoring to plow our stiff clay ground for wheat. But we conquered, of course, and "got there" at last, firm in our own conviction we could pretty nearly defy the natural obstructions. July 20, I could plainly see the nice, green, juicy ensilage must be fed to our fourteen dairy cows, or we should loose our volume of cream. I had covered the pit lightly with straw. Removing that, I found the clover in fair condition. As the weather was hot, I concluded it would be best to keep our cows in the cool, stone basement barn through the daytime, giving them all the clover silage they would eat. It was a grand success the first week, and I came near blowing my big trumpet and inviting visitors: but I was too busy away from home to attend to it. The second week it commenced to mould a little, and grow worse every day, until, in three weeks, we could not get the cows to eat it clean, and were compelled to throw away fully one-half of that clover ensilage, or rather use it for bedding. I usually feed from thirty to forty head of cattle from this sized pit, but I could not well go to other farms to get up a sufficient number of my young cattle to make this large number, and I could not feed it fast enough to fourteen head of cows to save it. We did let the cows out into the pasture nights for cool moist pasture feed, and water. They did splendidly in milk, and kept a continuous flow of it without any sudden shrinkage, but I lost far too much silage to make such an experiment a success. My pits have two hundred and twenty-five square feet of surface measure. I think if I had one only ten feet square, and then run my clover grass through a feed cutter, it would have packed tightly and I could then have saved it all when needed, to feed this small number of cows. I now have four of the fifteen by fifteen pits for my regular winter ensilage, but I am going to build me a small ten by ten pit for summer use for dairy cows only.

I hate to be beaten on any thing, and it mortifies me to lose my wind in this manner, but I may have caused others loss and this time I don't say my small silo will do better until I know for certain it will, after a good fair, trial.

There can be no doubt that the large, Southern white corn will grow the greatest number of tons of feed per acre of any crop we may plant; and if thinly planted, in rows not less than three and one-half feet apart, with kernels of corn from eight to twelve inches apart, and then thoroughly and carefully cultivated and hoed if necessary, it will develop into its highest stage of perfection, if allowed to stand in the field until near its full maturity. The largest deposit of saccharine matter is fully developed when the corn itself is in the roasting ear

stage. I found, by repeated experiment, when superintending our sorghum sugar factory, that all varieties of corn, as well as Amber cane, yielded the greatest amount of perfect sweet when the corn, or grain, was near maturity, but yet a little soft.

The value of ensilage is mainly from its sugar deposit. Thickly planted ensilage corn lacks this quality. The plant must have sunshine, air, and good tillage. The leaves possess but little value of themselves alone, and only serve as gatherers, or lungs, to absorb sweetness from the atmosphere through the day, and deposit it all in the parent stalk at night. Consequently, a slight frost, late in the season, may be no great actual damage. I would far rather suffer the loss of leaves than two weeks needed development of this saccharine matter; therefore I advise the holding of the crop until near its best condition; because you have done all the work and been to all the expense, and you might as well hold still and let nature more perfectly complete the job.

The great majority of our northern Ohio land will produce from twelve to twenty tons per acre of this green cornfodder, in its natural juicy condition, and I have no trouble at all to develop one hundred bushels of ears of corn, which I let go through the feed cutter with the stalks, and I find it then makes me a good, fairly-balanced ration for my cattle, with plenty of grain with their feed, and I do not feed any other as long as my ensilage lasts. I have taken pains to separate the grain, cob and all, from the fodder; twice that was contained in a bushel basket full of cut ensilage, as I took it from my pit for feed; and I found almost four quarts of the grain in each trial. I feed, on the average, about one and a half basket fulls of silage at a feed to each animal, and it makes as large a grain ration as I care to feed to cattle for regular performance. Of course, if I am fattening a beef or making a dress parade of some animal, I stuff them more and perform the ordinary tricks of trade. I don't quite equal the old fellow who had the miraculous old cow that gave so much milk on oat straw alone; he said it was poor quality at that and was never half threshed.

I am very confident the bad results often reported of silage being sour and unsatisfactory feed for stock, is due entirely to too thick planting and immature fodder, and as a consequence, no saccharine development; but in place of it, a sour, flashy, bulky feed, with no great amount of virtue in it. Remember it is quality instead of quantity that wins the prize and gains the golden crown. Many instructors advise feeding part dry feed all the time. I do not believe this is absolutely necessary; when proper care is taken at commencement. On one of my farms, my son being in charge of it, I found the heavy feeding of ensilage at start gave our cattle scours, and we had to stop feeding it exclusively until a healthy condition returned.

It has been my practice to allow my cattle a free run to a straw stack in my covered shed barn yard for an hour or two each day through the winter, while we clean the stables and put down fresh bedding; and that amount of dry feed, the straw alone, kept them in perfect condition; and with morning and evening feed of the ensilage, I can safely cry Eureka! I find so many farmers that have fed ensilage to breeding ewes in February, March, and April, with such grand results, that I think there is no mistake, but it forms the capstone of successful early lamb raising.

My son tried an experiment with his crop of ensilage corn this year, that was a surprise in its results.

He placed his entire crop in silo without running it through our feed cutter at all. It required only two men to leisurely save the crop, cutting the crop and filling the pit as their convenience in farm work would permit. He took great pains to lay the stalks straight and level, changing butts and tips to do a good job. There was no rush or hurry, but a two or three weeks' job, as other farm work would permit. This may prove to be the removal of a serious objection of many farmers. If they can avoid the extra, needed help of filling the silo when using a feed cutter; and also its attendant expense; and by this means simplify the work, it is possible its adoption may become quite frequent. He has found from this experiment the fodder and corn both heat, settle, and all pack together nicely, and seems to keep without any trouble. But the large stalks when taken from the pit to feed, are not nearly as handy as the finely cut ensilage to handle, but it can be done and *must* be done, if you get into the trap. He takes this out with a manure fork, and keeps the silage as nearly level in the pit, while feeding, as he can. The cattle keep at work eating it all up clean. The large stalks and whole ears of corn are easily eaten by them, because, in a soft condition. I hardly believe the division of grain is or can be made as evenly from this easy manner of filling the pit. I shall try one pit of my four at the home farm next fall in this same manner, and can then judge better of its economy or merit. My son also filled one pit with green clover grass direct from the machine cutting and leaving it covered for winter feed. On opening it in December, it was a partial failure; it did not possess sufficient natural moisture to soften it or heat itself so it could pack well, and he also made a great loss on clover ensilage. This was not run through a feed cutter.

A more expensive quality of ensilage can be secured by cutting your common field corn after it has come to full maturity, and place it in good, large shocks; and later, when you fill the silo with the green late corn ensilage, mix it by running through your feed cutter every third or fourth load from the field of this fully matured field corn. The green ensilage corn will furnish moisture sufficient to moisten up the whole mass; it will pack perfectly, and the heat of the ensilage will cook up this hard glazed corn to that soft condition, and hold it there for months, until you need to feed it. It is the most perfect ensilage I ever saw. You save every particle of your field cornfodder, you save husking the entire crop, you save the time and expense of grinding. It makes a perfectly digestible feed, and there is no waste from undigested corn and the voidings of cattle prove it. Your Mr. Edgar Huidekoper is feeding it to-day from his silos. I put eight acres of my field corn up in this manner last November.

Allow me to repeat in part a portion of my paper of yesterday, because we may have others present.

THE MODERN SILO.

The two essential points to be secured are, first, an air-tight pit, second, a non absorbent of heat, and moisture.

The difficulties thrown in the way of silo adoption have largely arisen from the too profound knowledge of scientific advisors, or teachers, and the enormous expense they advised at first of solid masonry or concrete silos. This was an effectual bar to the poor man's use of them. A more careful study of the subject by practical men has discovered fallacies that lessen the confidence materially in these wise men's opinions, and suggest in future more thought be given to

economy in all the new departures. Another hindrance was the false impression that the silo could add virtue to its contents, not visible or present at time of harvest. It was repeatedly advised that anything green, if carefully saved in the silo, would come out of the transformation box perfect animal food. Men of wealth and high standing would tell us this, and at the same time, when you could get into the confidence of their old cows, you would quickly hear from them "It's a lie!"

It is no use, at this late hour, to advise the saving of immature or undeveloped fodder. You must be satisfied with holding the food value it contained at harvest, for the silo process will not add one iota to that. Next, it is unwise to build a solid masonry silo pit, no matter if you have piles of money to give away. The concrete pit must step to one side for the same good reasons. Both of these will absorb the heat of ensilage to a very high degree, and hasten decay of the contents around the outside and near the walls of the pits. The best silo now made is of single thickness, narrow, board ceiling, planed and matched, none of it over four inches wide. Planed in order to have it of even thickness and a perfectly smooth surface. It should be matched in order that it will hold its place when not filled with ensilage. And be narrow enough so it cannot possibly shrink out of its matching. As soon as this cheapest of all silos is filled with the green, juicy ensilage, it immediately commences to swell the ceiling of the pit, both air and water tight, and in about twenty-four hours it is as perfectly so as any cider barrel you ever saw. It is then air tight and possesses every desirable quality in a silo. You cannot better it or its qualities for the preservation of animal food. You do not lose the heat to any high degree, you do not waste the moisture, and it would be just as sensible to ask for a double set of staves to a liquid cask or cider barrel, as to ask for two thicknesses of boards for a silo. A common practical farmer will admit this proposition at once, but a highly educated man who has planted his opinion upon a different set of instructions, often hates to come down. He does not feel as sure over it, however, as the others, who have fooled away from five to fifteen thousand dollars apiece for solid masonry silos, that could have been built, with same capacity, for two or three hundred dollars, out of single thickness board ceiling and done better work.

The single thickness ceiling is better than double boarding for several reasons:—First, when filled with ensilage and in its wet condition inside the pit, the decay is very slow indeed, if any at all; for, as soon as emptied, air, coming to both sides of the board it dries out quickly, and there is then no perceptible decay. Every man who has had experience in lumber knows that if you will keep it thoroughly dry it will last for ages.

It is an utter impossibility to put two thicknesses of boards together, with paper between them, and let them be saturated with water or moisture, and afterwards allow them to be empty a portion of the year and dry out, or the self same thing, if there is no paper, and prevent rapid decay. You confine the moisture there, and it can but hasten decay. It is possible two thicknesses of boards planed nicely could be put on more cheaply than the matched lumber I advise. You could lap joints easily enough, and secure the air-tight condition; but with the necessary damp condition when filled with silage, the inside board is more apt to huff up, and I have seen many of them do this and waste, by this little air chamber, some of the ensilage. I do not advise the building

of silos by any farmer who does not intend to keep at least ten head of cattle or more, or fifty breeding ewes for early lambs. Brood sows are great feeders on ensilage and the little pigs are happy in its extra juice. A mistake must not be made by building pits of to olarge a surface measure. It ought to have fully ten head to eat the contents of a one hundred square feet surface measure silo. My two hundred and twenty-five feet silos need fully thirty head of cattle, and I usually keep forty head to feed from them when opened. I can then feed it fast enough so none will waste.

Practical experiments may yet prove to us that the silo may be dispensed with to good advantage on ranches, or with feeding large herds of cattle in warmer climates than ours; and the keeping of corn ensilage in open air, in stacks, or ricks, is perhaps possible. We have writers who assert this as a fact, and thus far their neighbors do not contradict it through the press; while that might not result in loss so great as the expense of silo and preparation of it, I am still inclined to believe it would only answer for cattle that were to be fed out of doors or in large herds. I think the successful milk producer will be forced to adopt the good, warm barns and cheap wooden silos to attain an enviable reputation among his fellows, or a pocketful of ready cash, at the dairy business. Almost every farmer is mechanic enough to build a silo himself, but I did not intend to give a silo paper in full at this meeting.

If you contemplate building a silo in a barn, you must use the studding or girting that is wide enough to fill out flush with the timbers in the barn, so there shall be a perfectly smooth inside surface to the pit. I have six silo pits. Part of them are ceiled up on girting and the boards are put on perpendicularly, and the others are nailed on studding and are horizontal.

I cannot see a particle of difference in their keeping quality of the ensilage, and it is my judgment there is no real difference in the efficiency of them. I should say, build them the easiest and cheapest way you can. If you build two or more pits side by side, be careful to tie the partition walls thoroughly, so the pits cannot spread apart. I ceil both sides of my partition walls when putting it on horizontally, and let the ceiling lap on to each outside stud, then spike a two-inch piece on the corner over the side ceiling, so I can then ceil up the remaining sides and have a good strong corner. I have seen a few pits where the sides were ceiled up first and the partitions put in last, that gave out entirely under pressure of the ensilage, and some of it was lost. They had then to be drawn back to place with large iron rod bolts, and far more expense added than to have done it right in the start. If you desire to use the bay part of a barn for silo you can safely let the ceiling run clear down to the original ground, and then fill up about six inches deep or a little more with cobble stones, and upon this put fine sand or gravel, and it makes an excellent floor.

I have two made in this manner, and we throw in a little chaff or fine straw on the bottom of the pit at first, and when ensilage cutting comes to hand, we fill the pit on this kind of floor and there has never been any loss worth mentioning from this source. We find the heavy weight covering of the silo a needless waste of time and material. This is no great loss. A little will mould on top, but a little covering of some kind of bedding material, such as straw, chaff, damaged hay, or swamp grass will answer every purpose. Put nothing there but what is needed in the barn and save all that extra work. Hundreds of these cheap, single-ceiling silos are now in use, all of them doing good work

so far as the silo is concerned. Some mistakes are made in the filling of silo pits with too dry material. A few have attempted to partially cure the fodder or use dry field cornstalks to help fill up, and by this means have not had sufficient moisture in the silage to cause it to heat up and cook and pack to perfection. There is no necessity of cutting ensilage before hand to improve its quality. It may be safely done, however, and placed in piles on the ground and hold sufficient moisture, if it is an object to do it, to save having too great a number of workman at once.

There is no great necessity for extra expense to guard against frost when building silos. The heat of the ensilage makes it frost proof. Any common, tightly-ceiled barn or well-battened barn covering will be ample.

Never fill the space between the outside ceiling of a barn or silo pit and the inside ceiling, but leave it open and clear for an air chamber. A few mistakes have been made by this needless filling and it held moisture so badly that it injured the pits very much in two or three years. Frost is no trouble to ensilage. The doors to a silo pit should extend from top to bottom and be in short sections so that in feeding from them only a three or four feet section need come out at a time.

The moderate silo believer and enthusiast is well pleased with the results. He cares but little for theory, but if he has a quality of feed the old cows eat greedily, and it makes them pour down the milk and butter far better and cheaper than dry feed will do it, he can very satisfactorily say "good enough until we can do better"

In building silos you economize barn room by making the scaffold floors of your common stock barns sufficiently strong so you can have the entire basement of the barn for stabling stock. You will need that room to properly care for the increased number of cattle you will keep upon the farm as soon as you adopt the silo. The extra space above the silos and roof should be crowded full of straw. The better economy requires it to be utilized for the dry feed ration needed to balance the wet juicy ensilage, providing it should give your stock the scours. I feed this ensilage to horses with grand success, but only about half the quantity I give my cattle. It keeps them in splendid condition and they like it. Commence with a very little at a time. All four of my silo pits on the home farm are built upon the second floor of my barn. I put in three-by-ten joisting only one foot apart from center to center, and in fifteen feet bents. I made two rows of bridging and underneath this my feed manger partition, studding with a little extra timber posts, which makes my fifty-ton silo pits perfectly safe above the stock. The floors to these pits are also only one thickness of inch ceiling or flooring, the same as the sides of the pits, and are better than more for the same reason. At first from filling the pit they will leak the juice, and my cattle and horses look for the cloud that furnishes that rain, but conclude it is but one of the many annoyances from man they are forced to bear. Excellent silos may be very cheaply built outside of your present barns, and allow them to run as high as the eaves of the barns and extend the barn roof to cover them. I cut my ensilage fodder all up on the ground and with a thirty-foot carrier to the machine I can elevate the finely cut fodder over the top of the pits. I have two pits in each of my barns and make two settings of the machine in the barn yard.

It gives me fair sailing for my teams and the traction engine power used to do the work.

If you are to purchase your lumber for silos, the best quality of clear pine will last the longest. Next to this, good yellow poplar lumber; or, following this, comes the seconds of each, and from that, cucumber; or in absence of these, you can use any kind you choose. I have mine built of cull lumber, free from checks or knot holes; lumber that I had left from sale in my mill yards. I have oak, ash, pepperage, and elm ceiling. All do good work and my cattle take no exceptions. My fifty-ton pits did not cost me twenty-five dollars apiece building them, as I did in the barn. Of course if built separately, they cost the same as all other wooden structures in any locality. Every farmer can go home from this meeting, cut his timber from the tree, secure his lumber, stick it up to dry, make his plant of ensilage corn and before next September or October he can build his silo himself in the waste time of visiting after the season's harvest of hay and grain upon the farm. The grand possibilities of the silo, for the farm and its economy, will enable you all to produce greater results with same labor. It intensifies your farm work, it enables you to keep an even step with the progress of the day, and an animal to each acre of land is possible for the farm. It is likely the greater production will have its influence somewhat as a factor in the price of your farm produce, but you are fortified by a greatly reduced price or cost of production. You are benefitting the world by this increase of its capacity.

We are living larger lives than ever before; civilization demands of us advance; it is a duty, it is a pleasure, it is a moral strength to our manhood, to know that we are nearer approaching perfection in all our farm work and that we convince the world of our worthiness to hold possession of land.

REMARKS.

I feed my horses about half the quantity that I do my cows. It keeps their digestive organs in healthy condition.

Mr. Brooks, of Salem, Ohio, keeps over two hundred head of cattle on two hundred acres of land, making use of thirteen silos.

Two years ago I had an invitation to go and give my experience with the wooden silo, at a farmers' institute. The result of that meeting was the building of a hundred wooden silos that year. To say that the next years' meeting was a grand success is needless.

You can, if you wish, in your ensilage, use considerable dry fodder or grain. To feed horses it might pay to put in some straw.

Mr. CROOKER. It seemed kind of natural for us farmers to get together last night, and have a nice discussion by ourselves—the old, old style of farmers' discussions. But when the lawyers, and the professors, and the judges, and last, but not least, the printers, had to tell us what a nice position we were placed in to-day, and how much better a position farming was than anything else, it raised my position so high that I felt proud. I was afraid, in the last remarks, that there was not going to be any representative of our farmers, and I was glad when our president got up and represented us. It does seem strange to come up here and find men who know more about our business than we ever dreamed of. Take our press, and in the reports made we will not get the full remarks made on our side.

Mr. PHELPS. I supposed this was an agricultural society, but we are getting away from the subject. Now we started on the question of ensilage and silage. We have heard some talk touching on politics, but we came here to discuss agricultural questions. It is well enough

to speak of farmers' interests, and I think we should, when the time comes, have this thing wound up. I think we should discuss these questions properly, I do not say there is no politics in our problem. Now, in speaking on ensilage, I do not wish to contradict this very interesting and valuable paper, but I cannot agree with the paper on all the points that were recommended. First, it said that the single board silo is the best; but I do not believe it. I am afraid that if we adopt this course there will be a great many failures in the country, and silos will not be a success. If a man makes a cheap concern and in the spring finds his ensilage spoiled, he will say that the silo is a failure. Do not go too much on cheapness. I believe that the silo with the double board side, with tar-paper between, is the right thing. I have tried both ways. The great question is to have the silo air-tight. I have my doubts about soft lumber; I think it will warp and twist about. Now with my clover ensilage I am willing to tell my failures as well as my successes. I put my clover in whole and tried to pack it, but it would not pack, and I had mouldy ensilage all around the outside, and for about eight inches it was rotten ensilage; but the inside was good and the cattle ate it very freely. Next year I will cut my clover ensilages.

A MEMBER. How long do you cut your clover?

Mr. PHELPS. I do not know, but the shorter it is cut the easier you can pack it. It has been remarked that ensilage was no better when it comes out of the silo than when it was put in; but I say it is better, and form my opinion from this point. Of course there is no substance that goes into the crop, but the ensilage is entirely cooked, and by this cooking process comes thorough fermentation and when it is taken into the stomach it goes right on in the process of digestion, and it is better for the animal. I know that it is a great deal better when it comes out than when it was put in.

A MEMBER. Do you believe in covering your silo?

Mr. TALCOTT. Yes, sir; I believe in covering the silo. I cover with oil-paper, and I had some muck that I had let lay one year and it became like ashes; I piled this on to the paper about six inches deep.

A MEMBER. Where is it best to take the silage from the silo?

Mr. TALCOTT. Now, in regard to feeding from the top or from the sides, there is a great deal in this question. It is owing to circumstances. If you build a square silo, by all means commence at the top; an oblong silo feed from the sides. My silos have no partitions in them. I commence at the top and uncover just as I feed, and then keep working down until I get to the bottom, all the time working off a little from the sides so as to prevent moulding. I rake down the sides every day as fast as I feed, consequently the ensilage is fresh.

Mr. CROOKER. What kind of corn do you use

Mr. TALCOTT. I have used two kinds, the B. and W., and the red cob corn. For ensilage, I would rather have the B. and W.

Mr. ROOT. What per cent. of ensilage do you lose by decay?

Mr. PHELPS. If I should tell you in a few words, I should say not any. I have had some mouldy ensilage on top; I throw it out in the barn-yard, and when I turn out my cattle it seems to disappear. You can have fifty per cent. if you do not do it right, or you can have a hundred per cent.

Mr. STEELE. Do you plant your corn for ensilage as early as you do your other corn?

Mr. PHELPS. Yes, sir.

A MEMBER. How far apart are your rows? How much do you put to the acre?

Mr. PHELPS. I drill it in and run every other hose, leaving it five and one-half feet apart. I plant twelve quarts to the acre with the expectation of harrowing out one-half of it.

A MEMBER. What is the use of putting in more than you want?

Mr. PHELPS. You will harrow out quite considerable.

A MEMBER. Do you find the same amount of corn in the same amount of fodder?

Mr. PHELPS. Yes, sir.

President SIBLEY. I think we were the first to put in a silo this side of the Allegheny mountains, and we have filled it every year since, but I think that feeding this right along without any other food would not meet all the requirements of life. We could eat some particular food and thrive on it for a while, but I think none of us would like to be confined to any one diet too long. Now, I have taken dry corn-fodder and given to my cows, and I found that they would leave the ensilage to eat that, and I found that they liked clover and from that a change to timothy. I think the greater variety of food we have the greater profit we will receive from our herd. I do not think it would be well to take our vice president's advice on the clover experiment. We tried that clover experiment and filled a silo and when we took it out the next spring the neighbors said they could smell it all over five counties.

A MEMBER. What kind of corn would you plant?

Answer. I would never plant red-cob. I will use a corn that I know from experience will mature in this climate.

Mr. SHIPPEN. Mr. Huidekoper said that he filled his silo with corn direct from the field. This was some early corn which had been cut before he got his engine and his machinery ready to cut his fodder. We would be glad to hear from Mr. Huidekoper, I was not present when the paper was read on this subject. I do not know what has been said except by one or two of the last speakers. Last year I wanted to get my corn in as early as possible; I wanted to try this to prevent the cut-worm from destroying the crop. I had in fifteen acres and the ground was good. I planted half of the field to ensilage, B. and W., and the other half to the yellow dent. On the seventeenth of May I put on four teams to harrowing, on the eighteenth two teams, on the twentieth two teams. It was planted on the twenty-first and twenty-second of May, and it grew a good crop. We began filling the silo on the twenty-sixth of September. As the frost held off very late we got it all in in good shape. As quick as that corn came up we began harrowing it. I plant three and one-half feet apart, and if on a flat ground plant north and south. I first harrow and keep on harrowing until it is too high, and then put in the cultivators, then the shovel-plows. I got from the seven and one-half acres of B. and W., one hundred and seventy-five tons.

A MEMBER. Do you harrow over the corn?

Mr. HUIDEKOPER. Yes, sir.

Mr. CROOKER. What kind of harrow do you use?

Mr. HUIDEKOPER. A light smoothing harrow, just the common old double straight tooth harrow.

Mr. PRICE. Would you harrow stony ground?

Mr. HUIDEKOPER. I would harrow any kind of ground.

A MEMBER. Do you cross the rows?

Mr. HUIDEKOPER. Every way just to keep the weeds down.

A MEMBER. Do you harrow ordinary corn?

Mr. HUIDEKOPER. Everything.

A MEMBER. How much seed do you use per acre?

Mr. HUIDEKOPER. About one-half bushel. On the seventh of October we began to build the three silos that we have in the barn. I took one end of the barn and built the three silos, fifteen feet square and twenty-two feet high. I ordered an extension to the carrier which did not arrive as the manufacturers agreed. We finished our work on the twenty-fourth of October. Some time, along about the fourth of October, we were threatened with frost, I stopped filling silo and put a gang of men to work in the field cutting and shocking the corn. We commenced with the ensilage cutter again on the seventh of October. The next week had some trouble and did not work more than two days. On the twenty-fourth of October we finished putting it in the silo. Some of the corn stood three weeks in the field.

A MEMBER. Which was the best?

Mr. HUIDEKOPER. The first we put in was too green and was not sufficiently matured. That is a little sour, and does not come out nice. I want corn ready to husk.

A MEMBER. Did you water it any?

Mr. HUIDEKOPER. Yes, sir; a little, to dampen it. The engine left me and I could not put in any ensilage. I was in a little doubt about putting in any ensilage that had been shocked, but was advised to go ahead and put it in. But while the engine was gone I let the men husk a little.

Mr. BROWN. How much water did you use?

Mr. HUIDEKOPER. When the engine came back we had to cut up the stalks that were dry. We would carry water and sprinkle over the top of the pit and we continued to do this with all the dry corn; probably put on twenty-four gallons of water to twenty tons.

Mr. SIBLEY. How many pounds do you feed to an animal?

Mr. HUIDEKOPER. About a bushel basket full twice a day. From forty to fifty pounds, according to the age of the animal.

Mr. BROWN. Do you find it sufficient without grain?

Mr. HUIDEKOPER. I think this will keep them sufficiently well. My animals are in good shape; I feed hay at noon.

A MEMBER. Will you let your corn dry before putting it in the silo after this.

Mr. HUIDEKOPER. No, sir; I will go to work at the earliest and quickest matured and put it in as quick as it is ready to husk, and then keep right on with the rest as fast as it is ready.

Mr. PHELPS. What is the object of putting on the water?

Mr. HUIDEKOPER. This corn must take a certain heat in fermentation. If there is not enough moisture in the corn it would burn, to a certain extent. By putting on the water it will heat up to one hundred and twenty degrees and perhaps higher.

Mr. PHELPS. I cannot see the object of getting corn dry and then wetting it.

Mr. HUIDEKOPER. If you have a large amount of corn to cut, you must put some of it in dry, and then you must put in the water to get that heat. I do not know exactly what heat our corn got, but think from one hundred and ten to one hundred and twenty degrees. Cold mornings I would put my hand down in the pit, and it would burn my fingers.

Mr. HUIDEKOPER. One point in putting up ensilage is to keep it level; if you do not you will get bushels of grain around the bottom. If kept level you will get the corn distributed equally in the ensilage.

A MEMBER. Does it make any difference in fermentation, being a long time in filling the silo?

Mr. HUIDEKOPER. I don't find that it makes any difference, but I am going to try to fill more regularly this year. We were delayed in our work and left the pit too long, and the top began to mould before we covered it up. We put fresh ensilage on the mould and it worked to the top.

Mr. BROWN. Would it be safe to fill it to the top at once?

Mr. HUIDEKOPER. I think so.

A MEMBER. Do you think there is any saving of labor by cutting the corn up instead of husking it?

Mr. HUIDEKOPER. I think, taking the husking, shelling, handling and grinding that it takes more labor than cutting it up in ensilage. Where a man has a large crop to put up, if you husk your corn you cannot put your fodder in a way to keep it. Some of it must stand out in the storm and quite a bit of it will rot, and you will lose quite a large percentage. In ensilage you get everything.

A MEMBER. Do you put any covering on your silos?

Mr. HUIDEKOPER. No, sir; I do not; but you will find from five to seven inches on top that is spoiled. I had not the covering to put on; I concluded that it was probably as cheap to cover it with ensilage; I will cover it next year for I will have plenty of straw to cover it with.

A MEMBER. Does your ensilage keep well in the corners?

Mr. HUIDEKOPER. In some places it does not keep well in the corners here it was not tramped enough, and some places around the sides it does not keep well, but not enough to take any account of.

A MEMBER. How would you do in shocking your corn; put it in small or large shocks?

Mr. HUIDEKOPER. I would rather have it in small shocks, as it is easier handled.

A MEMBER. I cut up corn one season and put one hundred hills in a shock, but I do not think it was right to put so much in a shock, but the fodder was much better than in small shocks. I husked four bushels of corn from one shock.

A MEMBER. How long do you let it stand in the silo before covering it?

Mr. HUIDEKOPER. Do not cover except with the ensilage.

Mr. BROWN. Would it not be possible for a man to ram it into the corners so that there would be no loss?

Mr. HUIDEKOPER. I think there might be some loss. I do not think they could ram it so tight that there would not be a little air there.

A MEMBER. Do you cut your corn with a reaper?

Mr. HUIDEKOPER. Did not have any success with it. When you get a large stalk it is hard to cut.

A MEMBER. How do you mark out your corn ground?

Mr. HUIDEKOPER. Take the front bob of a sled.

A MEMBER. It seems to me that marking the ground with a sled would pack it so hard that the corn would not take root as well as though the ground was soft.

Mr. HUIDEKOPER. By drilling the corn the drill-teeth loosen up the ground.

A MEMBER. You drill by these marks and do not let the drill follow them, you merely have them to go by?

Mr. HUIDEKOPER. Yes, sir.

A MEMBER. Which is the best, spring or fall plowing?

Mr. HUIDEKOPER. I do not know.

Mr. MAGAW. There is one thing that you have to do, and do it right, that is to make your silo right. If you do not make it right it is a failure. The most amusing side of the whole thing is to see the cow eat its contents.

A MEMBER. Were you not discouraged in your first effort?

Mr. MAGAW. I tried ensilage several years ago, I found the trouble was that I put the corn up too green. That year I had to plant over and the fact is, I had pretty green corn-fodder. A great deal of it spoiled. Since I have learned that the corn must be ripe, full of sugar and matured, I have better success.

A MEMBER. What is the quality of your butter?

Mr. MAGAW. The quality of butter is good. I do not see but what the quality of milk is as good from my cow as it was when I fed wheat-bran.

Mr. HUIDEKOPER. I have an old bull; his teeth were so bad that he could not eat hay and grass; I was ashamed to show him to my friends. I commenced to feed him ensilage on the first day of December; he is now hog-fat, and as nice and smooth and as good-looking a piece of cattle flesh as there is in the county. He has had a little feed of bran in addition to his ensilage.

Mr. TALCOTT. I would like to offer an apology for introducing the political question as I did. I will say that every point I made, your own experience has verified.

Mr. FOWLER. I have been talking to men who are interested in this silo question; and I think we could carry this out with profit to ourselves and to the society. I will say of the executive committee that we have been unfortunate in regard to Mr. Adams, of Wisconsin, and Mr. Gould was to deliver a lecture upon this silo question, but is not able to be with us. Now as many of you know that he is reliable authority, and as we have not been able to get him, and by our treasurer's report we have \$350, on hand, and we will have the money that we expected to pay to Mr. Gould and Mr. Adams, I would suggest, would it not be wise for us to adopt a resolution to engage Mr. Gould to come into this section and deliver lectures and a talk upon this silo question? Have him deliver these lectures in various parts of this section, say we have a meeting here, one in Venango county and one in Erie county. I understand that Mr. Gould has sometimes made engagements for a very small sum. Now, I think it would be a very good idea to have Mr. Gould come here at the very earliest date possible. Now, to have this in proper form, I will move a resolution.

Resolved, That we appropriate a sum not exceeding one hundred and fifty dollars of the sum in the hands of this association for the purpose of engaging Mr. Gould to deliver a course of lectures on the silo, in this state, as soon as convenient; and that a committee of three be appointed, to consist of the president, vice president and secretary to arrange the same.

After some discussion, it was moved that the resolution be laid on the table.

Mr. MAGAW. This is a serious matter, it is worth one thousand dollars if we were going to have but one lecture. It would be a great ad-

vantage to the dairymen of this country. I have been here for years and you have made little or no progress. Upward of one hundred dairymen receive their money from me; and how many of them are losing money by their ignorance?

Mr. McKINNEY. I would like to say a few words in regard to this matter. We have had considerable talk on the silo, and we do not find two men of the same opinion. Now, if Mr. Gould were to come here, we will be in the dark as much as ever. And how will it be if the state finds us going aside from what the money was appropriated for?

Mr. CRITCHFIELD. I expect to vote against the resolution. Now, if there is but one meeting held in Crawford county it will not amount to much; or if we had one meeting in Westmoreland county it would not do much good. If you have the meeting, do not carry it off to one corner of the state. Our farmers are in as bad shape as any other farmers. We raise large crops of corn. I have left that and have gone into dairying.

Mr. CROOKER. I understand that there is quite an amount in the treasury. We can keep this for another year.

Mr. COCHRAN. Is this merely to get rid of the money? I will take it, and give Mr. Sibley as security.

On motion, it was agreed that the resolution be indefinitely laid on the table.

AFTERNOON SESSION.

Mr. Evans read a paper on dehorning cattle. He said:—

Gentlemen: I realize that your time is limited, and my remarks on this subject will be very short. While I do this, I realize the prejudice that exists in your mind to this new machine (the Fugate) or any other. I am not an agent for this machine or any other. I will confine my remarks to observation and experience.

DEHORNING CATTLE.

Reasons why Farmers, Stock Raisers and Dairymen should have their Cattle Dehorned—The Fugate Dehorning Machine.

The following is the address delivered by S. H. Evans, of Tidioute, Pa., at the farmers' institute at Franklin, February 4 and 5, and at New Castle, Pa., February 13 and 14, 1890:

The subject of dehorning cattle is comparatively a new one to me, although the object lesson which I have recently received, fully convinces me that in the near future "the horns will have to go." In making this broad statement I fully realize that all innovations upon old-time and prevailing customs, have always met with strong opposition. You are also aware that our respect for public opinion, and our fear of public criticism, also has a tendency to color our public expressions. We do know that some of the most valuable discoveries in science have had to contend against popular prejudice for a long period of time, before they were accepted as real. The same may be said of some useful inventions, yet they finally triumph. In this age of progress,

man (for humanity's sake) has always been improving on things as found by him in crude nature.

Compare for a moment the operation of propelling our street cars by electricity, with the old-time horse-killing process, and then do not cry out against any improvement simply because we are not accustomed to it, but let us patiently wait and see the good to be obtained by thoughts originally outside of our own brain, before condemning our benefactors. "Truth is mighty and will prevail," popular prejudice to the contrary. Therefore let us, like honest, practical farmers, stock raisers and dairymen, consider all the merits of this very important subject, laying aside all prejudice; and, if we can find in it any practice which promises to lighten our burdens and lessen our losses, to at least give it a fair trial and the benefit of a doubt. After a careful investigation, there is to my mind many good reasons for dehorning cattle, and as yet I have failed to discover any bad results from its practice. In the first place, it removes a great source of danger from amongst our herds. How many human beings have lost their lives and been sent to untimely graves, by being gored to death by some ferocious bull. Doubtless each of you can call to mind some one they know that was either killed or maimed for life by the horns of some ferocious animal. How often we hear some superstitious person saying, that "if the Allwise Creator had not designed that horns should be placed on the heads of animals, he would not have caused them to grow there," consequently man has no right to remove them. The good book informs us that the same Allwise Creator "gave man power and dominion over all beasts and every living thing." And there is about as much sense in saying that man is in duty bound to leave every other objectionable appendage attached to his dumb brutes, as he is to preserve the horns. I will admit, however, that cattle in their native state had use for their horns, in order to protect themselves and their young from the wolves and coyotes and other wild beasts that roam the prairie and forest, but since they have become domesticated they depend upon man for their protection. I will also admit that a pair of waxy, amber-colored, incurving horns, placed on the head of a beautiful, fawn-colored Jersey cow, is rather a handsome appendage to look at. But, aside from this, they are wholly useless and unnecessary to the animal. In a herd of Jerseys, or other breeds, horns, as a whole, are very objectionable, as well as injurious in many ways. How often we see them employed in injuring each other. In my own Jersey herd, within the past three years, I have had three cows lose valuable calves by being gored by one of their companions. In the month of November last, while driving my herd of Jersey cows into their stalls, one turned on another, and I believe would have gored her to death had I not been on the spot and rescued her. So intent was the brute in accomplishing her fiendish purpose that I could neither pull nor kick her away, and not until my boy (who was standing by) brought me a club, when with a few well-directed blows over head and eyes I caused her to surrender. Previous to this performance we had always considered this handsome, cream, fawn-colored cow, with amber-colored incurving horns, perfectly kind and gentle, but with all her good qualities she managed to protrude one of those beautiful horns at least three inches into the side of the young cow she had so fiercely pinioned against the front of the manger.

The final result of this fracas was an aborted, valuable calf—worth at least one hundred dollars at three months old. I was so provoked

at this seeming outrage that I at once sawed two inches from the ends of each of those "beautiful horns"—and had I been in possession of one of Dr Fugate's dehorning machines, I should have taken off both horns close to her head. As a rule Jersey cows are considered to be the most docile and gentle of any of the bovine tribe. But you will observe this, that every animal supplied with horns as a means of defense, will invariably lock horns for the mastery of the situation, with every strange animal of their kind you may chance to turn in with them, either in the pasture lot or barnyard. Serious results very often follow. How often we hear of some spiteful cow, steer, or bull, with their long sharp horns, goring colts and horses while running loose in the same pasture or barnyard together—sometimes disemboweling them on the spot. If there is anything provoking or expensive it is allowing cattle to gore their inferiors, and keep them away from their food and watering places, and force them, through fear of being gored by sharp horns, to stand out in the cold or storm, while the few bosses occupy the whole shed, which is large enough to accommodate a whole herd were they dehorned. Every stock raiser who has had his cattle dehorned well knows that one-third more cattle can be more comfortably and safely stabled in the same room than could otherwise possibly be done with their horns left on. When cattle are dehorned, if a boss happens to get loose no dangerous results will follow. A horned animal is all the time more or less excited and uncomfortable, so that to a certain extent his own well being is impaired by having horns. When dehorned they become quiet and gentle, and never liable to violent excitement, but they eat, drink, sleep, enjoy contentment and grow fat. On the other hand, the horns of the stronger are a terror to the weaker animals, often keeping them from their food, drink and rest, with a constant dread of being persecuted, gored, bruised, and excited in a tyrannical manner while they earnestly appeal to the pity of their merciful owner for relief. Why should not these circumstances alone justify us in removing all the horns? As a financial benefit there is no question. Last November I sold eight head of Jersey cattle to parties living in the State of Texas. I accompanied this shipment to that state. While in Dallas one day, some thirty or forty rack cars filled with fat cattle for the St. Louis market were side-tracked at that place. Here was my first object lesson on the subject of dehorning I ever received. Some of the cars were filled with large Texas steers with horns that would measure from one to two and one-half feet in length. Some of these animals were constantly goring and inflicting the severest punishment on those directly in front or near them, while their attendants on the outside of the car, were kept busy, with a long prod, retaliating on the unruly ones. No small amount of profanity was indulged in by the attendants of this stock, all on account of those beautiful, lovely horns (as I heard a lady call them at our last county fair). I leisurely walked down along the line of cars, and soon came to three or four cars which were filled with large, fat steers which had been dehorned. In these cars perfect order and quietude prevailed. No goring, no crowding, no butting, and no meanness whatever. In conversation with the attendant of this stock, he informed me they received from twenty-five to fifty cents per hundred pounds more for the dehorned animals than those shipped with the horns on. He said the dehorned stock went into the market in much better condition, having whole hides and unbruised flesh. He also said the dehorned cattle sold more promptly and at better prices. The cost of transporta-

tion of dehorned stock is much less, as a larger number can be shipped in the same car.

The above facts are, to my mind, also good reasons why our cattle should be dehorned. On my return trip from Texas, I crossed over the Indian Territory and Oklahoma, making my first stop at Wichita, Kansas. All along this route I saw hundreds and thousands of dehorned cattle quietly grazing and laying on fat for our eastern market.

The practice of dehorning cattle among the southern and western cattle growers is no new thing; as they are so well satisfied with its beneficial results that they do not hesitate a moment in dehorning all their cattle. They consider the cruelty which horned cattle inflict on one another is tenfold greater than the short and almost painless operation of dehorning them.

After leaving Wichita (in order to visit my son, who is a cattle grower in Seward county, Kansas) I traveled west about two hundred and fifty miles, passing through six of the southern counties in Kansas. All along this line I saw hundreds and thousands of dehorned cattle, and scarcely any with their horns on. I stopped one day at Greensburg, the county seat of Kiowa county. Here I received another very important object lesson of horns and no horns. A ranchman invited me to go out and look at two lots of his cattle which he was then feeding on corn, at thirteen cents per shelled bushel. He first took me to an enclosure where he was feeding about one hundred three-year-old steers. This lot were feeding at a trough filled with corn in the ear. Here you could see a lively display of those beautiful appendages called horns. Every animal appeared to be nervous and excited. Whenever one became tired of the spot he was feeding at, he would back out, and then you could see the fur fly by his goring his way through to the feed box again. This performance seemed to excite the whole line. I was then shown another enclosure which contained about one hundred and fifty three-year-old steers, which were dehorned. This lot was also feeding on corn in a similar trough. Here quietude and contentment reigned supreme. No excitement, no bossing, no goring, but each animal was as quietly and orderly feeding as so many sheep. The owner then pointed out two large steers and said, before they were dehorned they were the bosses of the whole herd. He said they would often stand at the watering trough for hours, and out of pure meanness would keep the balance of the herd from drinking. But since their horns were taken off there were no bosses in the whole lot, and as many would now drink from the same trough as could stand around it.

He informed me that he used the Fugate dehorning machine to do his work and that he had no farther use for the saw since the Fugate machine came in use. Each animal had the appearance of being a natural muley.

A few days after I arrived in Seward county, Kansas, notice was given that there would be an exhibition of dehorning about two hundred and fifty head of mature cattle with the Fugate dehorning machine, and among this lot there were about fifty large bulls that was a terror to even the cowboys that attended them.

Three experienced operators came from Lawrence, Kentucky, and brought with them on the cars a complete outfit of all the necessary appliances for performing a first class job of dehorning. It was astonishing to see how rapidly they would drop off the big horns, and dress the wounds, by laying over them a small pad of cotton batting well covered

with a healing ointment called "Arcanum." When one was finished he was walked out in front of the shute which held him, while another waiting to take his place was walked in through the rear; and thus the operation went on, and in five and a half hours, two hundred and twenty-five mature animals were dehorned and their wounds dressed, making about forty animals per hour. The operation performed by this machine was so quick and successful that the animal scarcely had time to know it was hurt. And, as soon as it walked out from the shute which confined it, it commenced grazing without any apparent knowledge of what had happened to it.

At this exhibition there were present several operators and advocates of dehorning cattle with the saw, the old-time and cruel process originated, I think, by Prof. Haaff, of Illinois. Before the dehorning commenced, these advocates declared they could drop off any horn, with from ten to fifteen strokes with their saw, which was made expressly for the business. They also seemed to have some doubts in regard to the successful workings of the Fugate machine. However, these doubts were soon dispelled. After the dehorning was all over, each one came forward and said: "There is no use arguing any longer for the saw, the Fugate Machine beats them all." I was informed that each one before leaving ordered a machine, and the right of territory to use it in. I was so highly pleased with the workings of this machine that I ordered one, as I had a vicious four-year-old Jersey bull at home, kept twelve months in the year in a box stall, tied by the ring in his nose to the manger. This bull for the past two years has been a source of continual anxiety and worry to me for fear some serious accident might occur to some one by a too free use of those "beautiful horns," which he was inclined to make a little too free use of whenever an opportunity presented itself. Of course we always handled this fellow with a "jockey stick" and with great caution. It was no unusual thing for him to knock his horns nearly half way through a dry two inch plank on his manger, while his attendant would be a proper distance on the opposite side. Not considering it safe to take any further chances, on January 23, I relieved Prince of St. Helier 15,174 of his horns, also myself of any further anxiety by having his horns taken off close to his head, by the Fugate dehorning machine. If any of my hearers doubts the correctness of this statement, or the ability of this machine to perform its work successfully, I would herewith present for your inspection one of the horns which has caused me so much dread and anxiety for the past two years. Since Prince of St. Helier was dehorned he has not missed a single ration, and is apparently in perfect health; his wounds are rapidly healing over and he is now perfectly docile, has no inclination to be cross or ugly, and can be handled with perfect ease and comfort, and what is best of all, without danger. No compensation would induce me to have his horns replaced and undergo the anxiety, dread, and fear which I have passed through for fear some serious accident might occur. And had I not believed that, by presenting this important subject for your careful consideration at this time that I might be the means of saving some valuable life, or some serious accident caused by the horns of some ferocious animal, I would have gladly declined your invitation, or should have selected some other subject for your entertainment at this time. A few years ago the subject of dehorning cattle was considerably discussed, principally throughout the western states. "The humane society," organized for the prevention of cruelty to animals, arrested a number of dehorning operators

for cruelty to animals. Among the number was Prof. Haaff, who was not only a skilled operator with the saw, but was at that time publishing a newspaper in Chicago called the *Dehorner*, which had for its motto "The Horns Must Go." As far as I have been able to learn, the courts in each case decided in favor of dehorning, as it was clearly proven that dehorning was not cruelty, but a benefit to the animals. I notice that a recent case in England, reported in the *North British Agriculturist*, was decided in the same way. These verdicts of the old and new world are now backed up by the individual experience of hundreds of skilled operators who have dehorned thousands and tens of thousands of mature cattle, and who now justly claim and believe the operation is a just and humane one, as it suddenly puts a stop to the great suffering and cruelty one animal inflicts upon another. In a recent letter from Secretary Edge, he informed me that the Society for Prevention of Cruelty to Animals had arrested and were prosecuting a citizen of Lebanon county for dehorning his cattle. I have not heard how this case was decided. As yet I have not been arrested for the operation of dehorning I had performed on my bull. Neither have I heard any insinuations in that direction. The nearest I heard to it was from a lady, when I showed her this horn, and informed her where it came from. She said to me: "You wicked, cruel creature you ought to be arrested for cruelty to animals." I said to her that I considered the life of one of my boys or hired attendants of far more value than ten thousand horns like this. I also said to her in the way of retaliation that she ought not to complain of cruelty to animals, as long as she wore a hat decked all over with stuffed dead birds, and also the wings of dead birds. She then said I could pass, that she had not even thought of those things being cruel. That no suffering is caused by the operation of dehorning with the saw I will not deny, but reforms never go backward; the Fugate dehorning machine comes to the front to take the place of the cruel saw.

By close observation and practice I am satisfied that the operation of dehorning is not as painful as many of the operations our farmers and stockmen inflict almost daily upon their domestic animals.

When properly done with the Fugate machine, it leaves no perceptible scar or blemish, and when the animal is released from the confinement necessary to perform the operation, it goes about feeding as though nothing had happened to it, and what is best of all, it ever afterwards conducts itself like a thoroughly reformed beast. Are not the above good reasons why the horns should come off?

The good book teaches us that the merciful man should be merciful to his beasts. I would interpret this to man.

The horns should come off. David in one of his Psalms says, "All the horns of the wicked will I cut off." The revised version does not state whether David used Prof. Knapp's saw, or one of Dr. Fugate's machines. But I am inclined to think, however, it was the Fugate machine. It is admitted by all Jersey breeders that Stoke Pogis 32,238 was the greatest Jersey bull, and most noted sire that ever lived, he being the sire of twenty-seven daughters which have an average tested butter record of over twenty pounds each in seven days. This bull, before his real value was known, became vicious, and, for fear some serious accident might occur, his owner ordered him slaughtered, and his carcass was sold in the market at Montreal, Canada.

Had the owner of this famous sire ordered him dehorned his, usefulness might have been retained, and his valuable blood more extensively

distributed throughout the Jersey fraternity. The untimely loss of this great sire to the country (on account of not being dehorned) has made his product very scarce and valuable and eagerly sought after. Of his twenty-seven tested daughters, Mary Ann, of St. Lambert, 9770, heads the list, with an official test of thirty-six pounds and one-fourth ounces of butter in seven days, one hundred six pounds and twelve and one-half ounces in thirty-one days, and eight hundred and sixty-seven pounds and fourteen and three-fourth ounces in eleven months and five days. I received a private letter dated February 17, 1889, from her owner, Mr. Valancy E. Fuller, of Hamilton, Ontario, with her photograph inclosed, stating that he had recently refused \$26,000 for her. Ida of St. Lambert 13,656, the second on the list of this great sire's daughters, also made the wonderful official butter test of thirty pounds two and one-half ounces in seven days, and the largest milk record for a day, week, and month, of any Jersey cow that ever lived. She was also purchased at a high price by our friends, Miller and Sibley, of Franklin, Pa.

I only refer to these two cows to show you what a valuable sire was lost to the country by the untimely death of Stoke Pogis III., and by using the butcher's knife instead of the Fugate dehorning machine.

I know you are now ready to ask me, if by dehorning a bull it would not impair his usefulness as a sire, and also injure his powers of prepotency, and power to transmit a desirable and valuable quality to his offspring. In reply would say, that so far I have failed to learn of a single instance where dehorning has had any deleterious effect on the offspring of either sire or dam.

Tormentor 3533 also became vicious and was dehorned. His fame as a sire ranks second to Stoke Pogis III., he having twenty-three tested daughters with butter records ranging from fifteen to twenty-three pounds each in seven days. Dehorning him made no difference whatever in the milk and butter production of his offspring.

Calfhood is the best time to take off the horns. When the calf is one month old the small part of the embryo horn will protrude far enough for the operation—the flint (or pith) not having then grown to any length from the head. When you wish to take off a calf's horns, part the hair from the horn and with a keen-edged knife cut so as to tap the flint clean and smooth. If it should bleed much, sear it over with a hot iron and the work is done. In flytime a patch covered with tar is a good thing to put on. Some may say this operation is cruel. I would say it is not as much so as either branding or castrating, as the tissues, bone formation, and nerves of sensation have not attained sufficient growth to make the operation painful.

I know I am wearying your patience by blowing my horn so long, but if you will bear with me for one or two more blasts, I will be done. In order to gain as much light on this subject as possible, I recently wrote to Mr. R. H. Steele, of Lawrence, Kansas, requesting him to give his experience with dehorning cattle. It was this gentleman who had charge of the dehorning exhibition previously referred to in Seward county, Kansas. On my return home we rode together as far as Topeka. I found him to be a very intelligent and practical stockman, and now, with your permission I will read to you his letter.

LAWRENCE, KAS., *January 20, 1890.*

S. H. EVANS, Esq. :

DEAR SIR: Your favor of the 20th inst. is received. In reply to your inquiry in regard to my experience with dehorned cattle, would say, that dehorned, or hornless cattle, feed as quietly side by side as so many sheep. They also occupy much less shed room. When drinking, as many as can stand around a trough do so, apparently with no bosses, while with horned cattle the bosses generally get to the front and keep the weaker ones back, to their disadvantage. In moving cattle from the field or yard for shipping, dehorned cattle are much easier handled, whether the number is five or five hundred. While feeding at the hay rack, I have seen by actual count, an animal for every two feet; while, at the same rack, previous to dehorning, five feet to the animal was the usual space required. My cows, before they were dehorned, were good fighters—in fact, I often felt uneasy as to the safety of my children, as the cows seemed to have a disposition to hook anything that might come in their way. Since they were dehorned they are as peaceable as calves. I never could detect any decrease in the usual flow of milk after dehorning my cows. I have now about one hundred head of mixed cattle, one-tenth of which are cows and the balance three-year-old steers—all dehorned. I feed them all together in a small lot on the ground, on unhusked corn. It is astonishing to see how close they will feed together. No fighting, no bosses. The advantage in fattening cattle is quite an item, as it requires a less number of feed boxes—less space for shelter, and much less feed, and when they are slaughtered they make the most wholesome beef produced in the world. I have been a shipper of cattle for the past twenty-five years, and know dehorned cattle sell more readily and at better prices. During the past year I have had about six hundred head dehorned without any loss. They were all dehorned with the Fugate machine. Since this machine has been invented I think dehorning has come to stay. Dehorned cattle ship much safer than those with horns on, and a less expense, as more can be put in the same car load. Dehorned cattle, when unloaded from a car, are as peaceable as sheep. In conversation with Armour's head buyer last week, he told me that some car loads of horned cattle come into the market so badly gorged and bruised that he would not even make an offer on them, and he always paid a higher price for dehorned stock. Nothing to my mind so much improves the appearance of a herd as dehorning them. It gives them a symmetrical appearance, and better dispositions.

Hoping that these few thoughts as to my experience may be of benefit to you, I remain,

Yours truly,

R. A. STEELE.

After Mr. Evans' address, the election of officers was taken up.

Dr. T. L. Flood was elected president for the ensuing year.

Dr. Flood remarked that other men could be found for the position, and wished to decline.

Mr. James said we have thoroughly canvassed the feasibility of Dr. Flood.

It was moved and seconded that the vote be unanimous for Dr. Flood for president. Carried.

On motion, thanks were rendered President Sibley.

AUDITORS' REPORT.

We have examined the bills of the treasurer, W. W. Dean, and find the same to agree with the bills and vouchers submitted.

E. W. SHIPPEN,

CHARLES LOTT,

Auditing Committee.

Mr. G. H. St. John nominated for secretary. On motion, the nomination was closed and the vote taken by acclamation.

On motion, W. W. Dean was nominated and elected treasurer.

The auditing committee's report on motion, was received and the committee discharged. The committee on resolutions offered the following which were adopted:

REPORT OF COMMITTEE ON RESOLUTIONS.

We, your committee beg leave to report the following resolutions, which are respectfully submitted:

WHEREAS; believing that the mingling together of farmers for the interchange of thought and ideas, is one of the most effectual means of education: Therefore, be it

Resolved, That we, the members of the Pennsylvania State Dairymen's Association do, now pledge ourselves to *constantly* urge upon our fellow farmers the necessity of attending the next meeting of the State Dairymen's Association and all similar gatherings where the object is the education of the farmer.

Resolved, That we ask and demand of our next legislature the passage of a law creating a food and dairy commission, whose business it shall be to look after, foster and protect the food and dairy interests of the state.

Resolved, That we tender to J. C. Sibley, our retiring President, our sincere, and most heartfelt thanks for his noble stand in defending the interests of ariculture against the encroachments of organized capital.

WHEREAS, We view with alarm the constant and growing tendency of our sons and daughters to leave the farm for other occupations; therefore, be it *Resolved*, That we urge upon our farmers the necessity of striving in every way to encourage the love of farm life in the young. As one means of securing this end, we further urge upon them that they not only bring their families to all agricultural meetings which they attend, but that they encourage them to take an active part in the same.

The committee on finance reported forty-five new members, making forty five dollars for the association treasury. The committee on utensils reports progress.

DISCUSSION ON GENERAL TOPICS.

Mr. W. W. Dean showed a sample of clover ensilage.

A MEMBER. What is the cause of its rank smell, and when does it begin?

Mr. DEAN. It was the large kind of clover and it grew up very large. It was in blossom when cut. I put up from forty to forty-five tons of green clover. I opened my silo on the first of August, and fed from it until the twenty-fifth of September; I fed every day. The cows would come up from fresh grass and eat ensilage.

Mr. PHELPS. I lay that rank smell to the clover having too much moisture in it when it was put into the silo. Clover for ensilage, should be cut after the dew is all off. Don't cut until the dew is all off. Now, I claim that clover should be matured as well as corn. I say that Mr. Sibley's clover was not right. There were no keeping qualities in it. If it had been matured it would have been all right. The blossom should begin to change before cutting. I claim that Mr. Sibley's failure was on account of the immaturity of the clover, and this smell comes from the lack of being matured.

Mr. CROOKER. Have you experimented with clover?

Mr. PHELPS. Yes sir.

Mr. DEAN. The first day I cut my clover there was no rain, but the second day it was rainy, but I kept the machine running right along.

A MEMBER. Were you troubled with mould?

Mr. DEAN. I have not been troubled much with mould.

Mr. STURTEVANT. I believe the great secret in regard to preparing ensilage is a knowledge of how much moisture may be put in to make it good. I put up a pit of field corn, and when I came to take it out, it smelt burnt up. The next experience I had I put up B. and W. corn which had not matured properly. It was too wet and spoiled. The weeds that grow in our fields are good for stock, and they can be used for food.

A MEMBER. I think a proper way to make ensilage is to plant two kinds of corn. Now, if we plant the B. and W. as quick as we can plant in the spring, and give it all the season there is, and next plant yellow dent corn to mix with it.

Mr. PHELPS. In regard to the amateur siloist, I want to impress upon your minds this point: Do not stay at home. Go out and investigate the silo and see what advantage it has. It is not for us to say whether we like that smell or not; let the cow tell that. As long as you are thinking that the idea of the silo is a good one, go out and look the silos over, and you will be convinced one way or another.

A MEMBER. One question I would like to ask. If this is a good feed why is it that you have to teach your stock to eat it?

Mr. PHELPS. I do not have to teach my stock to eat it. I have a calf five weeks old standing by the cow, and when I threw down dry ensilage to the cow the calf took right hold and ate it.

Mr. HUIDEKOPER. I had a car of dairy cows shipped me. I suppose they had never been fed anything of the kind, it took them a couple of days to get to eating it. When they are used to eating corn stalks and grain cut up, they will take hold of it more freely.

Mr. PHELPS. Suppose we have to teach our stock to eat it. Does that prove anything against the silo? You have to educate your cattle to eat oil-meal and bran.

Mr. CRITCHFIELD. I have some trouble to make them eat carrots, but never have any trouble about eating beets. I have had some cows that at first, refused to eat a little with grain, but they would at last, eat it all right.

Adjourned at 3.45 P. M.

NATURE'S ORIGINAL PACKAGES.

By Prof. W. I. CHAMBERLAIN, *Iowa Agricultural College.*

Did you ever think what the above expression may mean to the farmer now? On some farm products there is "a great gulf fixed" between producer and consumer, in prices, and that gulf seems to be widening and deepening. On other articles it is not so wide or deep, nor is the chasm increasing. What two classes of articles are they?

The first includes those that are subject to manufacture or at least subdivision after they leave the farmers' hands. They are not finished products ready for the consumer. The last class includes those that reach the final consumer in what I have called "nature's original packages." There is no chance in the case of such packages for the crime of adulteration, nor for the exorbitant profits of manufacture under patent. These are, I think, the two chief causes that widen the gulf between producer and consumer. Fresh fruits, vegetables, eggs, chickens.

turkeys, colts, etc., are samples of "nature's original packages" and are insured apparently against the sin of adulteration and the extortions of manufacture. Their perishable character, too, insures them against the extortions of storage in elevators, etc., and the manipulations of "corners" to boom or to depress prices. You cannot adulterate ripe apples, strawberries, grapes, potatoes and the like, nor can our cities manufacture them out of cottonseed oil or crude beef fat, nor adulterate them with glucose; a thing that happens to "pure" butter, lard, and maple syrup and the like if it stops over night in Chicago.

Trust or combination to limit total output and fix prices at will. They pay \$80,000 to four mills in Iowa to lie still or export their products; and we, the producers and consumers, pay the \$80,000, and enrich the combination besides. Invention should be encouraged, but inventors should not be permitted to "own the earth" and parcel it out to us at their own price. On sewing machines, mowing machines and the like, the buyer paid twice or thrice the real cost of manufacture, until the patents expired, or competition among patentees reduced prices. But often one patent practically excludes competition.

The expression used above, "nature's original packages" and the line of thought and remedy it suggests, are, I believe, original with myself. They occurred to me not long ago as I was studying for the hundredth time upon our present unquestioned agricultural depression. For more than forty years of distinct memory I have associated intimately with farmers as one of them, and I have never known a time when there was such a wide-spread feeling of being wronged, as now; so strong a feeling that agriculture is not now sharing in the blessings of this marvelous age to the same extent that manufactures, commerce, the trades and even the laboring classes that receive wages are sharing in it. I have seen harder times, indeed, but they were then hard times for all industries and occupations, not chiefly, as now, for the farmer. Farming land did not rise during the war inflation of prices like gold, wheat, wages, salaries, hotel rates, etc. These rose from 100 to 200 per cent.; gold and wheat both went up to \$2.80 instead of the normal \$1. But the strange thing is that land, which then rose scarcely 20 per cent., has now fallen one-half, nearly, while these other things that rose so immensely then have now, except crops and gold, fallen scarcely at all. Salaries, hotel rates and even wages of skilled and farm labor seem to have stopped at the high water mark of the war, while professional fees have even risen.

The farmers' staple crops, his wheat, corn, cattle, hogs, are lower than almost ever before, but he must pay his hired man, his grocer and butcher about the same as at the highest prices. Farmers now out of debt and with health and sons, *i. e.*, with paid-up capital and free labor, can swing clear. Those in debt mostly sink deeper; and if they try to sell their land will hardly bring half its former value. Often it will not pay the mortgage placed upon it a few years ago, and then supposed most conservatively to represent only half the cost value of the farm.

All seem to acknowledge the general fact of depression, but each has a different sufficient cause for it; as for example, the tariff, the demonetization of silver, over-production, the discriminating freight charges of railways, the private ownership of land (Henry George), unfair taxation, pools and trusts, stock, grain and provision gambling and the like. Most of these causes no doubt operate more or less, some

of them largely, but none of them seems to lay the basis for a general and rational explanation, or to suggest a remedy.

The expression in the title suggests at least the means of finding the cause of, and the remedy for, the trouble; to show what forces operate against the farmers and how he may best meet and thwart or utilize them.

Is the general fact true as intimated, viz, that those farm products which reach the consumer in "nature's original packages" bring the farmer about as good returns as formerly, with about the old and reasonable margin between producer and consumer, while "unfinished farm products" subject to manufacture, possible adulteration or even subdivision, have gone down in price to the farmer while they have not gone down to the consumer? A careful comparison of current market quotations, with my clear memory of forty years, has convinced me that this is true. Of course, allowance must be made for the wild fluctuations of the war. But prime, fresh fruit, potatoes and other vegetables, eggs, poultry and young horses bring those who raise and market them with reasonable directness, about as good prices as formerly, while grain, beef cattle, hogs and the like, that do not reach the consumer in "nature's original packages," are ruinously low to the farmer, about as high as ever to the consumer, with an immense margin of profit between.

For a few striking examples of manufacture under patent, take local prices at Ames, Ia., a few days ago, when I last inquired. Oatmeal or rolled avena at the grocers in neat two-pound packages, fifteen cents for two pounds. Oats bought at the elevator not a stone's throw distant for fifteen cents for thirty-two pounds, a bushel. That is, the farmer must give sixteen pounds of oats for one pound of oatmeal; 1,600 per cent. profit between producer and consumer. This does not account for wastes of milling, but they are not great when the "oat-shorts" sell per ton for feed at about what they cost per ton. How and why is such profit from producer and consumer possible? Simply because our present laws make a patent an absolutely unrestricted monopoly for seventeen years. In this case owners of patents on machinery and methods of manufacturing oatmeal join hands, form as in the case of the telephone, and the air brake, etc.

At the same grocery, best roller-process flour retails at \$6 per barrel, and at the same elevator wheat brings sixty cents for shipment. Ten bushels of wheat buy a barrel of flour. Five bushels used to buy a barrel of flour. The roller-process came in under patent, increased by ten per cent. the product of flour per bushel of wheat, and widened, by 100 per cent., the former margin between producer and consumer.

In the same town best two and three-year-old heifer beef sells on the hoof at two cents per pound, and steaks and roasts sell from the butcher's block at twelve and one-half cents per pound. Well, the "big four" of Chicago have largely killed off local butchering by alliance with the railways and the local butchers, and push down prices to the producer and keep them up to the consumer. This case does not fall under patent, however.

Of the abuses that grow out of adulteration of products I cannot now speak. In butter, cheese and lard, farmers have felt them worst and we begin to have needed laws for our protection.





◆ ◆ ◆ KEYSTONE ◆ ◆ ◆

Origin, 1874, near Mt. Joy, Lancaster County, Pa., on the premises of John Kready. Supposed seedling of Concord. Vine a strong grower, healthy and vigorous, and holds its foliage until fruit is fully ripe. Bunches large, uniform, compact and generally shouldered. Berries about size and shape of Concord; color, black with a bluish tint; skin tough; quality good, ripening with Concord. Keeps well: in a cool, dry place has been known to remain in eatable condition until March.

State Historical A.

PENNSYLVANIA.

1870

1870

Attest, I, the undersigned, being a duly qualified and sworn officer of the State of Pennsylvania, do hereby certify that the foregoing is a true and correct copy of the original as the same appears from the records of the State of Pennsylvania.

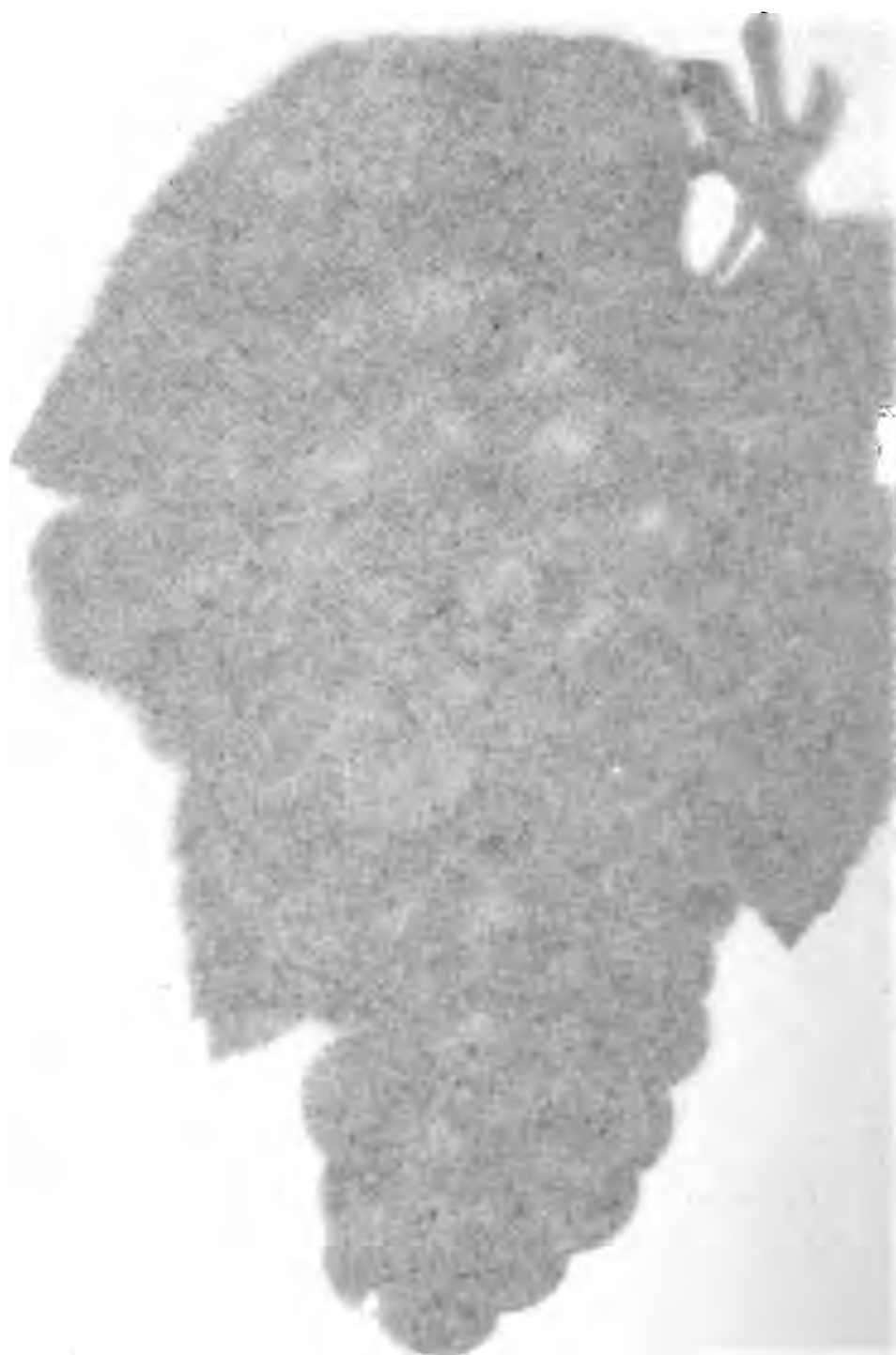
Witness my hand and seal of office at Harrisburg, this 1st day of August, 1870.

JOHN W. HARRIS, Secretary of the State.

Attest, I, the undersigned, being a duly qualified and sworn officer of the State of Pennsylvania, do hereby certify that the foregoing is a true and correct copy of the original as the same appears from the records of the State of Pennsylvania.

Witness my hand and seal of office at Harrisburg, this 1st day of August, 1870.

JOHN W. HARRIS, Secretary of the State.



REPORT
OF THE
State Horticultural Association
OF PENNSYLVANIA,
FOR 1890.

CONSTITUTION.

ARTICLE 1. This society shall be entitled "The State Horticultural Association of Pennsylvania," and its object shall be the advancement of the science of horticulture and pomology.

ARTICLE 2. Any person may become a member of this society by a vote of a majority of the members present, at any meeting, and by paying into the treasury the sum of one dollar annually; or the payment of one dollar to the treasurer, at any time, shall constitute membership, and entitle said member to a copy of the proceedings. The payment of ten dollars at one time will constitute life membership.

ARTICLE 3. Its officers shall consist of a president, three vice presidents, a recording and corresponding secretary and a treasurer, all of whom shall be elected annually by ballot.

ARTICLE 4. The following committees shall be appointed: A committee of five on nomenclature; a committee of three on insects, of whom the professor of entomology shall be chairman; an executive committee, consisting of the elective officers of this association and three of whom, including the president, shall constitute a quorum; and a general fruit committee, consisting of one member from each county represented, with a general chairman of the whole, each member of the fruit committee to have the privilege of appointing two assistants.

ARTICLE 5. The society may, at any time, elect honorary members.

ARTICLE 6. The society may, from time to time, appoint professors on entomology, botany, horticultural chemistry and geology.

ARTICLE 7. This constitution may be altered or amended by a vote of two-thirds of the members present, at any regular meeting, notice of the proposed amendment, in writing, having been previously given.

ARTICLE 8. Seven members shall constitute a quorum for the transaction of business.

BY-LAWS.

ARTICLE 1. The Committee on Nomenclature shall collate and decide the standard and synonymous names of all fruits known in the society, with the authorities for each, and report, so far as practicable, at each regular meeting, and record the same in a book kept for that purpose.

ARTICLE 2. The General Fruit Committee shall carefully and thoroughly investigate the subject of fruit culture in general. Each local committee of three shall collect such useful and interesting information in relation to the subject as may be in their power, and embody the same in monthly reports, to be made to the general chairman; such reports to be by him examined and embodied in his annual and semi-annual reports. Also that the said county committee shall form *ad interim* committees for their respective counties; and further, that said *ad interim* committees are hereby authorized to publish the reports in the *Gardeners' Monthly*, or such other paper as they may select, the same having been first submitted to the chairman of the general fruit committee for his approval: *Provided*, That said publication shall be free of expense to the association.

ARTICLE 3. The annual meeting of the association shall be held on the third Wednesday of January of each year, at such a place as the Executive Committee may appoint, at which time the election for officers shall take place; said officers to serve from the close of the meeting at which they are elected to the close of the succeeding annual meeting, at which an exhibition and discussion of fruits shall take place and other business transacted in the following order:

- 1st. Reading of minutes of previous meeting.
- 2d. Roll call and dues collected.
- 3d. Election of officers.
- 4th. Reports of officers.
- 5th. Reports of standing committees.
- 6th. Reports of special committees.
- 7th. Unfinished business of former meeting.
- 8th. New business.

The nomination and election of new members shall be in order at any time during the session.

ARTICLE 4. Other meetings may be convened by the Executive Committee at such time and place as they may appoint.

ARTICLE 5. No member who is in arrears for dues shall be eligible for any office, or serve on any standing committee; and any member who shall neglect to pay his dues shall cease to enjoy the privileges of membership.

ARTICLE 6. A library shall be established for the benefit of the members of this association, and a librarian elected annually with other elective officers.

Section 1. The librarian shall keep an alphabetical record of the books, etc., and may loan to any member of this association any books contained therein without cost: *Provided*, That it be returned within three months, and in as good condition as when received.

Section 2. Any member refusing to return to the librarian books or reports from said library, shall pay their equivalent, or forfeit his membership.

LIST OF OFFICERS FOR 1890.

PRESIDENT.

H. C. SNAVELY, Lebanon.

VICE PRESIDENTS.

JOSIAH HOOPES, West Chester.

H. M. ENGLE, Marietta.

W. M. PANNEBAKER, Lewistown.

RECORDING SECRETARY.

E. B. ENGLE, Waynesboro'.

CORRESPONDING SECRETARY.

W. P. BRINTON, Christiana.

TREASURER.

J. HIBBERD BARTRAM, Milltown.

LIBRARIAN.

THOMAS J. EDGE, Harrisburg.

PROFESSOR OF BOTANY.

THOMAS MEEHAN, Germantown.

PROFESSOR OF ENTOMOLOGY.

S. S. RATHVON, Lancaster.

PROFESSOR OF HORTICULTURAL CHEMISTRY.

S. B. HEIGES, York

PROFESSOR OF ORNITHOLOGY.

Dr. B. H. WARREN, West Chester.

CHAIRMAN GENERAL FRUIT COMMITTEE.

CYRUS T. FOX, Reading.

COMMITTEES FOR 1890.

GENERAL FRUIT COMMITTEE.

CYRUS T. Fox, *Chairman*, Reading, Berks county, Pa.

COUNTY.	MEMBERS.	P. O. ADDRESS.
Adams	J. V. Garrettson,	Flora Dale.
Allegheny	E. P. Swift,	Mount Oliver.
Armstrong	J. Donaldson,	Kittanning.
Beaver	A. L. McKibbin,	Green Garden.
Bedford	J. Z. Replogle,	New Enterprise.
Berks	C. T. Fox,	Reading.
Blair	F. Jaekel,	Holidaysburg.
Bradford	R. M. Welles,	Towanda.
Bucks	Henry W. Comfort,	Falsington.
Butler	J. W. Phillips,	Zelienople.
Carbon	George Dolon,	Pockerton.
Cambria	W. A. Little,	Loretto.
Cameron	F. G. Judd,	Emporium.
Clarion	J. H. Patrick,	Clarion.
Centre	Prof. George C. Butz,	State College.
Chester	J. W. Pyle,	Willow Dale.
Clearfield	Samuel Hall,	McGee's Mills.
Clinton	Joel A. Herr,	Cedar Springs.
Columbia	J. K. Sharpless,	Catawissa.
Crawford	James Turner,	Meadville.
Cumberland	H. S. Rupp,	Shiremanstown.
Dauphin	Gabriel Hiester,	Harrisburg.
Delaware	Samuel Larkin,	Booth's Corner.
Elk	W. H. Johnson,	Benezett.
Erie	G. A. Evans,	West Mill Creek.
Fayette	Samuel Wakefield,	Red Lion.
Forest	J. B. Agnew,	Tionesta.
Franklin	Dr. B. L. Ryder,	Chambersburg.
Fulton	B. C. Dawney,	Hustontown.
Greene	L. W. Gwynn,	Carmichaels.
Huntingdon	G. W. Owens,	Birmingham.
Indiana	J. P. Stuchul,	Indiana.
Jefferson	S. H. Whitehill,	Brookville.
Juniata	J. E. Jamison,	McAlisterville.
Lackawanna	A. C. Sisson,	La Plume.
Lancaster	L. S. Reist,	Oregon.
Lawrence	Samuel McCreary,	Neshannock Falls.
Lebanon	Jere E. Dougherty,	Lebanon.
Lehigh	W. B. K. Johnson,	Allentown.
Luzerne	P. Sutton,	Exeter.
Lycoming	Peter Reeder,	Hughesville.
McKean	A. J. Hughes,	Port Allegany.
Mercer	W. H. McKean,	Mercer.
Mifflin	Henry Ort,	Lewistown.
Monroe	R. F. Schwartz,	Analomink.
Montgomery	E. Satterthwait,	Jenkintown.
Montour	W. M. Gearhart,	Danville.
Northampton	A. S. Shimer,	Redington.
Northumberland	William L. Nesbit,	Lewisburg.
Perry	M. B. Eshelman,	Newport.
Philadelphia	T. B. Meehan,	Germantown.
Pike	Edgar Pinchot,	Milford.
Potter	E. O. Austin,	Austin.
Schuylkill	Thomas Hoy,	Orwigsburg.
Snyder	J. B. Boyer,	Mt. Pleasant Mills.
Somerset	D. J. Horner,	Somerset.
Sullivan	E. A. Strong,	Dushore.
Susquehanna	Myron Kasson,	Montrose.
Tioga	S. M. Baker,	Brookfield.
Union	S. C. Sheller,	Lewisburg.
Venango	J. Miller,	Franklin.
Warren	W. Cowan,	Warren.
Washington	Pressly Leach,	Burgettstown.
Wayne	Theodore Day,	Dyberry.
Westmoreland	A. Ruth,	Scottdale.
Wyoming	N. A. McKown,	Tunkhannock.
York	Samuel Small, Jr.,	York.

COMMITTEES FOR 1890.

COMMITTEE ON NOMENCLATURE.

H. A. Chase, *Chairman*, Philadelphia.
Geo. D. Stitzel, Berks county.
H. W. Fulmer, Allegheny county.

J. T. Smith, Juniata county.
Edwin W. Thomas, Montgomery county.

COMMITTEE ON ORCHARDING.

Col. George F. McFarland, *Chairman*,
Dauphin county.
J. G. Engle, Lancaster county.

Jacob Heyser, Franklin county.
Edwin Davis, Juniata county.
John Hoffa, Northumberland county.

COMMITTEE ON FLORICULTURE AND ARBORICULTURE.

William H. Moon, *Chairman*, Bucks co.
P. C. Hiller, Lancaster county.
John C. Hepler, Berks county.

George Achelis, Chester county.
John C. Cullen, Northampton county.

COMMITTEE ON ENTOMOLOGY.

S. S. Rathvon, *Chairman*, Lancaster co.
Ezra High, Berks county.

Herman Strecker, Berks county.

COMMITTEE ON ARRANGMENT AND RECEPTION.

Calvin Cooper, *Chairman*, Bird-in-Hand,
Lancaster county.
A. H. Yeager, Greenland, Lancaster co.

Daniel D. Herr, Lancaster, Lancaster co.
Jos. F. Witmer, Paradise Lancaster co.
E. B. Engle, Waynesboro', Franklin co.

LIFE MEMBERS.

Bartram, J. Hibberd, Milltown, Chester county.
Brinton, W. P., Christiana, Lancaster county.
Calder, Rev. James, Penn Yan, N. Y.
Chase, H. A., 1430 S. Penn square, Philadelphia.
Cornelius, Robert, Philadelphia.
Engle, J. G., Marietta, Lancaster county.
Engle, H. M., Marietta, Lancaster county.
Engle, E. B., Waynesboro', Franklin co.
Ermentrout, Hon. James N., Berks co.
Fox, Cyrus T., Reading, Berks county.
Garretson, Joel V., Bigler, Adams co.
Hayes, Charles P., 149 North Fifteenth street, Philadelphia.
Heyser, Jacob, Chambersburg, Franklin county.
Hildrup, W. T., Harrisburg, Dauphin co.
Hacker, William, Philadelphia.
Hoopes, Josiah, West Chester, Chester county.

Hiller, Casper, Conestoga, Lancaster county.
Hiller, Peter C., Conestoga, Lancaster county.
Landis, Israel, Lancaster, Lancaster county.
Martin, J. O., Mercersburg, Franklin county.
Pannebaker, William M., Lewistown, Mifflin county.
Reist, Peter S., Lititz, Lancaster county.
Scribner, Prof. F. Lamson, Knoxville, Tenn.
Shaffner, Jacob, Harrisburg, Dauphin county.
Swift, E. P., Mount Oliver, Allegheny county.
Thomas, George B., West Chester, Chester county.
Thomas, Edwin W., King-of-Prussia, Montgomery county.
Van Deman, H. E., Washington, D. C.

HONORARY MEMBERS.

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|---|---|
| Barry, P., Rochester, N. Y. | Rowe, Hon. D. Watsen, Chambersburg, Pa. |
| Downing, Charles, Newburg, N. Y. (deceased). | Rutter, John, West Chester, Pa. |
| Ellwanger, George, Rochester, N. Y. | Saunders, William, Washington, D. C. |
| Garber, J. B., Columbia, Lancaster county, Pa. (deceased). | Stitzel, Hon. George D., Reading, Pa. |
| Meehan, Thomas, Germantown, Pa. | Thomas, John J., Union Springs, N. Y. |
| Michener, Dr. E., Toughkenamon, Chester county, Pa. (deceased). | Warder, Dr. John A., North Bend, Ohio (deceased). |
| Parsons, S. B., Flushing, N. Y. | Willets, Rev. Dr., Philadelphia. |
| Parry, William, Parry, N. J. (deceased). | Wilder, Hon. M. P., Boston, Mass. (deceased). |
| Rathvon, Prof. S. S., Lancaster. | Wickersham, Dr. J. P., Lancaster, Pa. |

ANNUAL MEMBERS.

- | | |
|---------------------------------------|---|
| Adams, James, Mifflintown. | Davis, Edwin, Thompsontown. |
| Ailman J. T. Thompsontown. | Day, Theodore, Dyberry. |
| Avery, E. E., Dyberry. | Deppen, G. B., Myerstown. |
| Bachman, T. F., Kreidersville. | Deaterly, David, West Newton. |
| Baer, J. C., Hamburg. | Derr, Cyrus G., Reading. |
| Bartram, George H., Milltown. | Dougherty, Jere E., Lebanon. |
| Bartram, M. T., White Horse. | Edge, Thomas J., Harrisburg. |
| Bell, William, Mifflintown. | Endlich, G. A., Reading. |
| Butz, Prof. George C., State College. | Eppihimer, Henry, Reading. |
| Bernhart, Major F. S., Reading. | Eshleman, Elam W. Leaman Place. |
| Bickel, Isaac, Reading. | Eshleman, M. B., Newport. |
| Biddle, F. C., Chadd's Ford. | Fegley, Albert H., Reading. |
| Boyer, John F., Mt. Pleasant Mills. | Fink, George W., Port Royal. |
| Breneider, Charles, Reading. | Fisher, J. J., Oil City. |
| Bretz, William, West Fairview. | Fisher, W. H., Reading. |
| Briggs, W. H., Carrick. | Fleishman, Benj., Reading. |
| Brinser, E. C., Middletown. | Fox, E. S., Reading. |
| Brossman, Adam R., Robesonia. | Fulmer, H. W., 129 5th st., Pittsburgh. |
| Brought, J. L., Strode's Mills. | Gaul, Jas. W., Wernersville. |
| Brumbaugh, A. J., Reading. | Gerhart, Dr. T. S., Beckersville. |
| Bucher, Riley, M. D., Lebanon. | Gettle, A. L., Mt. Zion. |
| Campbell, A. W., Belleville. | Greenleaf, Dr. R. P., Henry Clay, Del. |
| Campbell, John A., Belleville. | Griesemer, Charles A. Z., Reading. |
| Cullen, Peter, Reading. | Groh, Israel, Shaffertown. |
| Card, F. W., Sylvania. | Gutshall, Col. John, Carlisle. |
| Cheetham, J. H., Reading. | Hain, Adam L., Stouchsburg. |
| Cocklin, E. H., Bowmansdale. | Harrison, J. E., Natrona. |
| Comfort, H. W., Fallsington. | Hartzler, J. K., McVeytown. |
| Cooper, Calvin, Bird-in-Hand. | Hawley Jesse G., Reading. |
| Cullen Peter, Reading. | Heiges, Prof. S. B., York. |
| Curwen, John, Jr., Villa Nova. | Heikes, W. F., Huntsville, Ala. |

- Heinley, G. H., Reading.
Heiser, H. J., Shadle.
Hendel, Henry B., Reading.
Hepler, John C., Reading.
Herr, Daniel D., Lancaster.
Hertzler, S. A., Strode's Mills.
Hertzler, John, Sr., Port Royal.
Hershey, Jacob H., Rohrerstown.
Hiester, Gabriel, Harrisburg.
High, Ezra, Reading.
Hill, Sam'l J., Pricetown.
Hoffa, John, Milton.
Hoy, Thomas, Orwigsburg.
Jameson, James, Reading.
Jameson, J. E., Swales.
Keim, Isaac W., Reading.
Keller, Col. D. C., Reading.
Kendig, M. D., Creswell.
Kenny, James R., Reading.
Keppler, Jno. A., Mt. Pleasant Mills.
Kershner, George W., Reading.
Kerstetter, O. S., McKee's Half Falls.
Kindt, S. S., Reading.
King, James P., 3316 Market st., Phila.
Kramer, Louis, Reading.
Kready, John, Mount Joy.
Kurtz, J. W., Thompsontown.
Lantz, J. C., Thompsontown.
Lantz, C. C., Van Dyke.
Leh, H., Allentown.
Leinbach, Joseph A., Reading.
Leinbach, George A., Reading.
Leonard, Maurice, Oakland Mills.
Leuloff, Jacob, Mifflintown.
Linville, J. C., Gap.
Livingood, Frank, Reading.
Long, O. V., Abbottstown.
Long, Walter S., Shirleysburg.
Longsdorf, D. E., Mechanicsburg.
McCready, Atchason, New Galilee.
McFarland, Col. George F., Harrisburg.
McGraw, J. G., Claysburg.
McGowan, Jas., Geiger's Mills.
McKee, Geo., Jr., Strode's Mills.
McMeen, Robert, Mifflintown.
McMeen, John, Thompsontown.
McWilliams, D. B., Walnut.
Maltzberger, H., Reading.
Meehan, Thomas B., Germantown.
Meredith, S. M., Reading.
Miller, Johnson, Lititz.
Miller, Charles, Salem.
Mohn, John G., Reading.
Moon, W. H., Morrisville.
Moore, William G., Womelsdorf.
Moyer, John M., Beckersville.
Murdoch, Alexander, Pittsburgh.
Muhlenburg, H. A., Reading.
Neischwander, Levi M., Berks.
Nimson, C. H., Cranberry, N. C.
Nolan, William, Reading.
Obold, John, Reading.
Obold, John H., Reading.
Ort, Henry, Lewistown.
Ort, Mrs. Henry, Lewistown.
Orth, John F., Reading.
Patterson, J. Kelly, Walnut.
Poth, Chas., 1st. ave. and Smithfield st.
Price, A. R., Mt. Union.
Pyle, J. W., Willow Dale.
Rakestraw, Thomas, Willow Dale.
Reist, Levi S., Oregon.
Reber, Henry C. G., Reading.
Rife, Jacob L., West Fairview.
Rittenhouse, H. M., Granville.
Ritter, W. S., Reading.
Rupp, H. S., Shiremanstown.
Rush, J. G., West Willow.
Ryder, Dr. B. L., Chambersburg.
Schweyer, D. A., Bower's Station.
Shuman, B. L., Mifflintown.
Sharpless, J. K., Catawissa.
Shellabarger, J. B., Thompsontown.
Shoemaker, R. C., Jarretstown.
Seidel, Franklin, Maiden Creek.
Smith, Elias, Van Dyke.
Smith, J. T., McAllisterville.
Smith, J. H., McAllisterville.
Smith, F. Leaf, Reading.
Snaveley, H. C., Lebanon.
Snyder, George S., Middleburg.
Snyder, Henry, Lewistown.
Sponagle, Andrew, Lewistown.
Stambaugh, H. A., Mifflintown.
Stoneroad, V. D., Lewistown.
Stauffer, A. K., Reading.
Stubblebine, Jno. G., Morgantown.
Swigert, S. J., Lewistown.
Thomas, Joseph W., King-of-Prussia.
Thompson, J. L., Thompsontown.
Van Reed, Wellington, Reading.
Wagner, George A., Alinda.
Walker, Dr. M. M., Germantown.
Weber, Phillips, McAllisterville.
Wenrich, A. M., Reading.
Wentzel, Aug. L., Reading.
White, Rev. J. W., Milroy.
Whitner, George K., Reading.
Woods, T. A., Harrisburg.
Wynnings, Roy, Lebanon (to 1892 inc.).
Yeager, A. H., Greenland.
Young, J. Gerhart, Reading.

A PEN SKETCH OF DR. S. S. RATHVON, PROFESSOR OF ENTOMOLOGY.

By Dr. F. W. GODING, *Rutland, Ill.*

In the series of "pen sketches of eminent economic entomologists" now appearing, the one having for its subject your honored acting State Entomologist occupies a prominent place.

Simon Snyder Rathvon was born, April 24, 1812, in the borough of Marietta, Lancaster county, Pennsylvania, where, with the exception of three short intervals, he resided until 1848, when he removed to Lancaster his present home. His people were remotely of Swiss descent, settling in Lancaster county many years ago. Between the seventh and tenth years of his age he attended four or five terms, of three months each, at three different common schools, where he "learned to read, write and cipher as far as compound division," which completed his education. When one reads the carefully-prepared articles from the Doctor's pen, plainly showing a wide acquaintance with all branches of knowledge, and with literature both ancient and modern, and remembers the very limited advantage he enjoyed in youth, he wonders where and how the Doctor obtained such a degree of learning. But this is made plain farther on.

During the next five years, he wrought at farm work, when he was apprenticed to learn the tailor's trade, an occupation he has ever since been engaged in.

His first entomological observations were made at the tender age of five, when he was taken to the woods, by his father, to see the seventeen year cicada; a little later his curiosity being aroused while witnessing the operations of the "mud wasps," and "paper-making wasps," the transformations of the Yellow Swallowtail, and the Regal Walnut moth. Although too young to understand such things they interested him, and the mysteries that surrounded them left a lasting impression on his youthful mind.

In 1832, he became a member of a literary society which numbered among its members Prof. S. S. Haldeman, Judge J. J. Libhart and others since prominent in their chosen fields; it was soon merged into a "Lyceum of Natural History" with Mr. Rathvon as secretary. It was while affiliating with this society that he first felt the need of proper literary training; and to understand and realize the want was a sufficient cause for action. At this time he devoted his spare time to the study of mineralogy, herpetology and ornithology, collecting and preparing specimens of all that the county produced. His attention was attracted to entomology in the following manner, given in his own words:

"Long trivially-spent years intervened between those early observations, and the subsequent period when I began to take an interest in natural science. It formulated itself in this wise: Seated upon the shop-board on a summer day, about fifty years ago, with a window opening on a garden full of weeds, the blooming umbel of a wild parsnip plant resting on the sill of the window, I noticed a great variety of insects visiting the plant, then flying away and soon returning again. I was perfectly astonished at the number and variety. I had previously been reading *St. Pierre's Studies of Nature*, in one of which he had related a similar observation,



S. S. RATHVON.

having noticed thirty species of insects visiting a single plant during a single day. Said I to myself 'I will see how many different kinds of insects will visit this plant in a day,' and forthwith I commenced capturing and impaling them on common pins and needles, and as I proceeded I became fired with a sort of enthusiasm, especially as the number far exceeded that of St. Pierre; although I subsequently discovered that the differentiations were largely varietal and sexual. * * * Without knowing, or even suspecting that a sort of mimicry exists among the different orders and families of insects; after a minute comparison, I noticed it conspicuously present even in this first collection. * * * I did not know of a collector nor a collection of insects in the world. One day the late Prof. S. S. Haldeman came into my shop, as he always did when in town, when his keen eyes immediately fell with delight upon my small collection. He informed me that he had just come into possession of the collection of then, the late Prof. Hentz, and invited me to come and see it. Of course I availed myself of the first opportunity to do so, and that visit inoculated me with the virus of entomology. Long years thereafter I came into possession of that consolidated (with the Haldeman) collection [which] with my own is now in the museum of the Linnean society in Lancaster city, Pennsylvania. There was no hereditary predisposition involved in it, as it is merely imitation, and the result of years of slow, patient and perserving labor. I unconsciously cultivated a love for it, and old habits gave way to the expulsive power of a new affection."

At first he made a general collection, but soon restricted himself to the coleoptera. About this time Prof. Haldeman was editing the *Pennsylvania Farm Journal* and requested Mr. Rathvon to write an article for publication on a coleopterous insect (*Epilachna borealis*) which was then particularly destructive to the cucurbitaceous vegetation of the county, and one on the cucumber beetle (*Diabrotica vittata*), these being the first products of his pen.

In 1869, Mr. Rathvon assumed editorial charge of the *Lancaster Farmer* continuing in the position until its suspension in 1884. In the columns of this periodical Mr. Rathvon is seen at his best as a scientific writer. Since 1861 Mr. Rathvon has been professor of entomology to the State Horticultural Society, and also to the Philadelphia Horticultural Society since 1864, succeeding Prof. Haldeman. Since 1862 he has been curator and treasurer of the Lancaster Linnean Society, and its entomologist, and has averaged about four papers annually to its transactions.

By request he contributed two papers to the United States Agricultural Reports for 1861 and 1862, which were properly illustrated, treating of the several orders of insects in a popular manner, in this way filling the position of United States entomologist. Since 1869 he has been entomologist to the Lancaster County Agricultural Society and has frequently read papers before that body. In June, 1878, Franklin and Marshall College conferred upon him the degree of Doctor of Philosophy.

The Doctor is a corresponding member of the following:

Academy of Natural Sciences of Philadelphia, American Entomological Society, Davenport (Ia). Academy of Sciences, and various local and state horticultural and agricultural societies; and in the transactions and reports of the above; in the *Pennsylvania Farm Journal*, *Lancaster Farmer*, *American Entomologist*, and the various local, daily and weekly newspapers are to be found some of his published articles which number among the thousands.

Dr. Rathvon was married May 27, 1834, to Catherine Freyberger, at Marietta, Pa.

Personally Dr. Rathvon is spare and under average size, eyes bluish-gray and hair auburn mixed with gray. He has ever been the champion of a high grade of morals, always taking an active part in religious matters, and for several years being leader of a religious organization.

Labor, faithfully performed, is always rewarded either directly or indirectly, and we find that the efforts made by the subject of this sketch were no exception to the rule. He is honored with the friendship and esteem of the most eminent scientists of the land, and has received many other honors already referred to. Although a very old man, he is actively engaged in business and apparently will smile on a hundred years. He has accomplished much, but might have accomplished more had not diffidence placed restrictions upon him.

In a letter to the writer he relates, clearly, his methods, objects and tastes in his entomological studies:

After the abatement, or modification, of my early ambition to collect and possess perfect specimens of the different species of insects, and bring them systematically together in a cabinet for my own gratification, I became impressed with thoughts of their uses, their abuses, their histories and habits, and their economic relations to human interests—and especially to the interests of the agricultural world. I therefore never, in a special sense, became a mere describer of new species (indeed I had not time) [he first described and named the "maple bark louse" (*Pulvinaria innumerabilis*) which has since attracted so much attention especially in the west], their external forms, their anatomical structures, their classification, etc., but rather what they did either good or bad; under what form they did it, when, where and how, and what was necessary for their destruction. This thought was suggested by an apparent demand for that kind of information; at the same time I did not ignore scientific entomology, but regarded it as a basis to economic entomology.

Dr. Rathvon's collection of coleoptera is in a good condition, although some of the specimens are seventy years old, and contains over twelve thousand specimens. About fifteen years ago he presented his small collection of diptera to Baron Osten Sacken and his hymenoptera to De Saussure; his orthoptera were totally destroyed.

As a writer you are all acquainted with the Doctor. His communications to your Society and other similar organizations, on noxious and beneficial insects and insecticides, are of great value and in every case, thoroughly reliable. His vocabulary is large, and he has a ready and facile use of his pen, always clearly conveying to his readers his ideas in language readily understood. His articles, as a rule, are elaborate, thoroughly exhausting the subjects before completing them. Had he received assistance from the state authorities, as he was encouraged to think would be the case, his great work on the injurious insects of Pennsylvania would have been published several years ago, and your state would have been instrumental in bringing out as did her sister state, a classic work on entomology.

During the past two years Dr. Rathvon has been a great sufferer from chronic physical afflictions, which frequently prevent him from performing any labor, either physical or mental. The *partial deafness* with which he has been more or less afflicted for the past forty years, has now culminated in almost *total deafness*, accompanied by vocal weakness and inarticulation. Still he is not entirely disabled, but works whenever he *can* work, with unabated interest. Should he survive until April 24, 1892, he will be an octogenarian.

STATE HORTICULTURAL ASSOCIATION OF PENNSYLVANIA.

Thirty first annual meeting held in the Court House, Mifflintown, Pa. January 15 and 16, 1890.

Notwithstanding the unfavorable weather which prevailed during the first day of our meeting, and the general epidemic of *La Grippe* during the winter months; the attendance was good, and the discussions, papers, etc., pointed and replete with practical interest. The exhibit of fruits was not as large as usual. Some new seedling apples were shown which attracted attention, one of which is illustrated in this report. Lancaster was agreed upon as the place for holding next annual meeting and it was decided to have a re-union of as many as possible of the original members of the society, who were present at the organization.

The following new members have been enrolled since our last annual meeting.

Life.

Hon. James N. Ermentrout, Reading.

Annual.

James Adama, Mifflintown.
Geo. H. Bartram, Milltown.
M. T. Bartram, White Horse.
Wm. Bell, Mifflintown.
Prof Geo. C. Butz, State College.
G. A. Endlich, Reading.
Geo. W. Fink, Port Royal.
Jas. W. Gaul, Wernersville.
Prof. S. B. Heiges, York.
H. J. Heiser, Shadle.
Jno. Hertzler, Sr., Port Royal.
J. E. Jameson, Swales.
Louis Kraemer, Reading.

J. W. Kurtz, Thompsontown.
C. C. Lantz, Van Dyke.
Jacob Leulouff, Mifflintown.
Walter S. Long, Shirleysburg.
Robt. McMeen, Mifflintown.
Jno. McMeen, Thompsontown.
D. B. McWilliams, Walnut.
Chas. Miller, Salem.
J. Kelly Patterson, Walnut.
B. L. Shuman, Mifflintown.
Jno. G. Stubblebine, Morgantown.
J. L. Thompson, Thompsontown.

THE MEETING.

The meeting was promptly called to order at two p. m. by President Snavelly. Minutes of previous meeting read and approved. On motion, roll call of members was dispensed with.

Mr. Fox. The prevailing sickness in Berks county will prevent the usual attendance of members from there. Ex-President Stitzel sends his congratulations, and regrets his inability to be with us at this meeting. Our Berks county members, though absent, are in sympathy with Juniata county in fruit culture. As an evidence of this, I will have the pleasure of handing before our adjournment, a check for fifty dollars to our treasurer for dues collected for the present year. Among them is the name of Judge James N. Ermentrout, who in 1864 and 1865 was a teacher at Tuscarora academy in this county. Probably some of the citizens present may recollect him.

The PRESIDENT. Through Mr. Fox's efforts Berks county has a large list of members in our association, and I hope some of our members from other counties will do as well.

Next in order is the election of officers for the coming year. The usual custom has been to appoint a committee on nominations.

On motion of Mr. Jameson the president was authorized to appoint a committee of five for that purpose.

President Snavelly read the following:

ANNUAL ADDRESS.

Fellow Members and Friends of Horticulture: A year ago you saw fit, without my solicitation, unexpectedly and undeservedly, to elect me president of your association, and much as I esteem the honor, I have not been able to reconcile myself to the wisdom of your choice, especially in view of the fact that others of our number would have filled the position more worthily.

We count among our members, men whose fame as horticulturists is not confined to our own state, but who are known over the length and breadth of this land as eminent in the science of horticulture. To such belong the honors of this association.

In view of this, you will perceive that it is with diffidence that I attempt to assume, not to fill, the position to which you have called me.

Invoking your kind indulgence and your hearty coöperation, I shall endeavor to preside to the best of my ability.

The custom of the president of this association to read an address had at this meeting perhaps be better observed in the breach than in the performance.

While I have nothing to advance that will commend itself specially to you, my remarks shall possess at least one merit the merit of brevity.

The past year has been an eventful one, it will be remembered as one full of disasters, especially by flood. While in all parts of our state there has been excessive rainfall, damaging nearly all the crops,

portions of our state have been devastated by unprecedented floods, resulting in the loss of many lives and almost irreparable damages to property.

Aside of the sufferers of the Conemaugh valley, the West Branch and the Juniata valleys, probably no class of producers suffered more loss than the growers of small fruits. The crops, in my locality, ripened when we had almost daily rains, causing the berries to be soft and without flavor and consequently not salable, much of the fruit not bringing enough on the market to pay for the gathering.

Not only was the early berry crop a pecuniary failure, but all our fruits suffered from the same cause, almost incessant rains.

This condition of things is discouraging, and it may keep some of us poor for a season but the true horticulturist will not despair with the loss of a crop; our association has a wider and broader field than the fruit garden. At one time this was purely a fruit growers society, but now horticulture in all its branches will receive equal consideration. Some of us believe that man does not live by bread alone.

We have enlarged the scope of our work, and I would suggest that we make an effort to increase our membership, invite our lady horticultural friends to become members of our association at a nominal fee or no fee.

Gardening, whether it is the growing of fruits, or the raising of culinary vegetables, or work pertaining to the flower garden and lawn, should be prosecuted with such intelligence and skill as to raise it to the dignity of an art. The work should not be prosecuted with a view to profit alone, pleasure should also be an end.

Plants rank foremost in the scale of creation; it was only after the Almighty had robbed the earth in beauty that man came on the scene. They were created for the sustenance of his body and to delight his soul. The blossom appealing to our sense of the beautiful, is the precursor of luscious fruit which appeals to our sense of taste and smell. How the soul, through the eye, can feast on the beautiful flowers, with which this earth is so elegantly and lavishly clothed.

To my mind God never intended that the earth should be "a vale of tears;" there is too much that is beautiful and good about us, for wherever the eye is directed it encounters multitudes of forms of vegetable life. This is for a wise purpose, for not only are these to contribute to the needs and happiness of man, but a study of them will lead us from nature up to nature's God. In all ages flowers have been regarded as things of beauty and emblems of innocence and virtue, and many of the finest poetical images have been drawn from them.

We are taught in holy writ to "consider the lilies of the field."

In ornamental gardening there has been a decided advance. I can very well remember many places, when a boy going over the country, the sight of flowers and shubbery would meet your gaze at long intervals. There were no ornamental or shade trees about the buildings, the fence enclosing the house would be within a dozen feet of the same, if there happened to be one, and the farm animals would utilize all the ground to the very front door.

This condition of things belongs to the past. The yard fence was moved away from the house from time to time, the house yard or lawn enlarged, and instead of affording pasture for the cattle and a rooting place for the swine the surface is covered with a velvety carpet of green.

Ornamental and fruit trees, vines, shrubberies and flowers have been planted, and instead of an unsightly place, cooling shade, graceful

shrubberies, luscious fruits and fragrant flowers, make it attractive and home-like, not only is there a change in the surroundings, the inmates of that house have become more refined, more intelligent and probably better citizens, certainly more progressive. It is a home, and every one is proud of it. Does not this spirit beget better citizens? The sons and daughters are loth to leave it; it is a home of many pleasant memories, memories of the spring time, of vivid verdure, expanding buds, long-expected flowers, and of singing birds. Memories of summer "with light and heat refulgent," imparting color and flavor to the luscious berries. Memories of autumn, when the verdure of summer turns to many a brilliant hue. Memories of winter, with the wind sighing through the pine tops, "a music of seas far away."

Where horticulture flourishes there is a prosperous and intelligent community.

It must have occurred to all of us that where orchards and berry fields are well cared for, and the home surrounded with trees, shrubberies and flowers, that such properties are seldom sold by the sheriff. Is this so without a reason?

But I shall take occasion to refer briefly to several matters that are, possibly to some of us at least, of a more practical character.

The apple from a commercial and economical standpoint will have to be placed at the head of the list of fruits, and it is doubtful if any other fruit tree has suffered more from neglect.

It is hardly creditable to our state, with all its varied soils, and our people fully as intelligent and progressive, with markets right at our doors, to import from other states annually thousands of barrels of apples, when, if varieties adapted to localities were planted, our home demand could be supplied and a surplus left for export. In view of the low and unremunerative prices that the cereal crops command, and the consequent depreciation of farm lands should not our farmers give attention to this king of fruits. It is to be feared that buyers and planters of apple trees, have been too much influenced by the finely-colored plates of the tree agents, whereas if the selections had been made intelligently and a knowledge of the adaptability to their locality, apple culture would have proved more profitable. The apple tree can be successfully grown in all sections of the state, and is comparatively free of diseases. It grows and thrives on level land and on all exposures, but the fruit does not correspond with the thrift of the tree.

In the peach we have to contend with the yellows, in the pear it is blight and leaf fungus, and in the cherry and plum it is the black knot, and yet, exempt as the tree is from disease, we are often without fruit. We fail mostly with winter and long-keeping varieties and where shall we look to to supply them?

There is no lack of varieties and yet the planter is at a loss to select such as are suited to his locality.

Stephen Switzer, of London, in 1723, describes twenty-one varieties of apples as then known to pomologists, and as worthy of a place in his book. Mr. Cox, the first American author, in 1817, describes and illustrates by cuts one hundred and twenty-three varieties, only partly of American origin; while Charles Downing, in his "Fruit and Fruit Trees of America," published in 1885, describes about two thousand varieties of this noble fruit. This large list of varieties is now being rapidly augmented by new and promising sorts. The question arises can the apple with suitable varieties, be successfully grown in this state? I would suggest that this question occupy a portion of your

time. The demand for this fruit is largely on the increase not only in this country but in England as well.

Mr. Gladstone, the great English statesman, in an address before a horticultural society, said that in 1830 there were 71,000 bushels of apples imported into that country, in 1869, 491,000 bushels, and in 1888, 3,800,000 bushels.

With such an increase of varieties to select from, and the ever-increasing demand for this fruit, the subject should merit consideration. Secretary Engle has devoted a great deal of labor to the preparation of a fruit list, and it is a valuable guide to such as are about to plant apple trees.

The peach, notwithstanding the *yellow*s, is now perhaps more extensively planted in our state than at any period within the last quarter of century. Right here, on the mountain sides flanking this valley, thousands of trees are planted every year, and this most luscious of fruits grown successfully and to great perfection. With continued success, and this seems to be assured, we can confidently look to this part of the state for our future supply of peaches. The orchards on the peninsula are said to be declining and this goes to make your ventures here the more promising.

I cannot forbear from alluding to that "queen of fruits," the strawberry. Of the so-called small fruits it stands preëminently at the head of the list. It is the first to ripen and at a time when the system craves a change, is more sought after by the masses than any other of the small fruits.

It is marvellous how the demand for this fruit has increased. Only a short time since it was regarded a luxury, and even the rich would only buy it at intervals, but, to-day, during its season, it is an article of daily consumption, and enjoyed by all classes, the poor as well as the rich. Do the masses ever stop to think when they buy a basket of fine strawberries for a dime and less, that it is due to the labors of a few noble spirits who are leading horticulture. Nor is ample credit accorded to associations like this.

If, to-day, there is a family in this state who own an acre of ground, and do not raise small fruits in sufficient quantity to grace their table twice or three times a day, they do not live up to their opportunities. Farmers who do not cultivate berries seldom buy them and their families have to do without them, and I can conceive of no better way of driving our sons from the farm than to stint our families of an abundance of fruit.

Nut culture has within the past few years received considerable attention, but not as much as its importance demands and especially the chestnut which is indigenous to large areas of our state.

It is not likely that for many years to come, the markets will be overloaded with fruit like the Paragon. Mr. Engle and others deserve a great deal of credit for bringing nut culture to the attention of the public.

Of the products of the culinary garden there is an increasing demand. Many of the vegetables now consumed were not demanded or not known a short time ago. Pork and other animal foods are largely supplanted by a vegetable and fruit diet; people prefer to live not so much on the "fat of the land" as on the good and more healthful vegetables and fruits.

Adverting to the planting of trees for timber I am not certain that the time has come when it will prove profitable to plant large areas.

There are places where trees could and should be planted, and where a moderate outlay would enhance the value of the land. I have in mind some trees that should be planted, all valuable for timber, and at the same time bearing edible fruit—the chestnut, the walnut and the shell-bark hickory. One frequently finds rocky knolls on farms where a clump of walnut or chestnut trees would grow up with profit, produce fruit to the delight of a coming generation and add to the beauty of the landscape. There are hillsides so steep that they should never have been brought under cultivation, some of these at least, could no doubt be profitably planted to timber trees. While planting along the highways is to be commended, indiscriminate planting should be discountenanced. It is better to have no trees where the road passes over damp ground, for the shade will exclude air and sunlight and keep the roads muddy.

Owing to the low prices obtained for much of our fruit the past season, much has been said about demanding of the government a duty on foreign fruits, notably the orange and the banana.

I seriously question the wisdom or propriety of such a tax, for it can hardly benefit the fruit growers of our state and would increase the price of such fruits as are taxed. Moreover, if one craves for an orange, he will not buy the apple, or if one wishes the banana, he will not buy the strawberry.

Insect pests and fungus diseases seem to be on the increase. The codling moth and the curculio are probably the most destructive insects, the latter is becoming more predacious from year to year, and not only does it destroy the plum, but the cherry and peach become a prey to this insatiate marauder; even the apple, the pear and the quince are disfigured by the crescent marks it imprints.

The preparations of sulphate of copper seem to be effectual in combating fungi, and the arsenites in destroying insect enemies; but when to apply, how frequently and how much to the different kinds of trees and plants does not seem to be clearly determined, or at least the large body of growers have no safe information. It is announced that the horticulturists of the different state experiment stations are to work on certain lines at the same time, and it is confidently expected that this important line of work will receive the earliest attention.

The losses caused by fungi and insects are simply enormous, and it seems to me that the stations could not enlist in any line of work that would prove more productive of good to fruit growers.

It has often occurred to me that in view of the good work this association has done and is doing for horticulture in this state, it should be accorded more substantial recognition. It has been practically self-sustaining and I predict it will continue to exist and grow in usefulness, spread abroad its benign influence, inculcate and diffuse a love in the people of that which is beautiful and good, whether it receives aid from the state or not. Its field of usefulness could no doubt be enlarged if more means were at our disposal.

In conclusion, hoping that this meeting may result in much good, allow me to thank you for your kind attention.

ANNUAL REPORT OF THE GENERAL FRUIT COMMITTEE.

To the Officers and Members of the State Horticultural Association of Pennsylvania :

GENTLEMEN :— The observation of the general fruit committee of your association, with reference to the horticultural and pomological results of each year, now extend to every section of the state. Reliable correspondents have been obtained in every county, and many of the counties have been divided into a half a dozen or more districts so as to have a correspondent in every fruit-growing locality. By this systematic arrangement the information obtained is of the most complete character, embracing as it does every detail of the year's operations. The several hundred reports received during the month of December, and up to within a few days of the meeting of this association, if published in full, would form a large volume. It is, however, not only impossible to present them in their entirety, but a very brief summary of each branch of observation can be given in this general review. The voluminous correspondence has been thoroughly sifted and the facts gleaned therefrom are herewith presented.

APPLES.

The apple crop was poor in the greater portion of the state. A protracted season of rain when the trees were in bloom, late frosts, and an unusually wet season, were undoubtedly the causes of the failure. Four-fifths of the correspondents report a very slim yield and quality of fruit decidedly inferior. Some varieties did comparatively well notwithstanding the very unfavorable season. Smith's Cider furnished a fair quantity of fruit, for instance, in portions of Bucks and Montgomery counties but the fruit was not as good in quality nor as fine in appearance, as usual. One gentleman in Chester county reported that he had a larger crop of apples than he ever gathered before, but there were many imperfect specimens. In some of the northern counties there was a very good yield of Rhode Island Greenings. In Dauphin county some growers had heavy crops of Baldwins, Kings, Russets, and Fallwaters. Other growers in the same county reported that their Baldwin trees failed to give any returns whatever. In the southern end of the Cumberland valley there was a fair crop. The York Imperial, Baldwin, Wagener, Northern Spy and Rhode Island Greening, were the leading winter varieties. In Armstrong county and some of the western counties there was a good crop of Baldwins, and the quality of the fruit was fair. The average in the state, however, was not over one-third of a crop. Some counties reported not over one-tenth of the usual average, and others a complete failure, owing to heavy frosts in May. It was certainly an "off year" for apples.

PEARS.

There was a moderate crop of pears, but the quality was below par, owing to the wet and cloudy weather, and the fruit colored poorly. The Keiffer made rather the best show, and the Duchess next. There was also a fair yield of Bartlett's in some sections of the state. Several correspondents, having probably favored locations, had exceptionally

large yields of pears, but the majority reported small crops of very inferior quality; the fruit being insipid, owing to ripening imperfectly. The leaf blight affected many varieties in August, stripping trees of their foliage.

Among the worst sufferers were Clapp's favorite, Louise Bonne de Jersey, and Bartlett, while the Keiffer, Lawrence, Vicar of Winkfield, Duchess and some other kinds were scarcely, if any, affected. Such varieties as Flemish Beauty, Sheldon and Winter Nelis, that at best have weak foliage, were entirely worthless. A Sullivan county correspondent reported an excellent yield of pears of fine quality. In York county there was an average crop, but the fruit commenced to drop early, and if picked and laid away, rotted before maturing. About three-fourths of the counties reported the trees to have been injured by blight.

PEACHES.

Failure is the proper word to use in speaking of last year's peach crop in this state. The wet weather affected the peach as much as any fruit. In very few orchards was there as much as one-fourth of an average crop. The prices, however, were very good throughout the season and partly made up for the short yield. Late varieties were ruined by the continuous rains. Young healthy trees bore well in some localities. The peach district of Franklin county furnished a good crop of prime quality and excellent prices were realized. The growers of the Juniata valley had about one-fourth of a crop. A Northampton county correspondent reported his crop to have been a total failure, but he visited an orchard of 2,200 trees loaded with handsome fruit in the same county.

The peach orchards of Berks county have been exterminated by the "yellows." Where there were formerly 50,000 bearing trees in the peach district in the southern portion of the county, only a few trees yielding any fruit can be found. There is not a single productive orchard in the county. E. H. Cocklin, of Bowmansdale, Cumberland county, who has peach orchards in the adjoining county of York, reports a good crop of peaches in yield, and favorable weather for gathering and marketing, extending from August 15 to September 5, or from Late York to the last of Crawford's Late.

PLUMS.

The plum crop was also injured by the wet weather, and from nearly every county has been received the same report—"No plums." The varieties that succeeded best were the Richland, Lombard, Bradshaw, Jefferson, Golden Drop, and German Prune. The curculio continues to be the chief enemy of the plum. Usually the crop of curculio is as large as that of plums.

Where the trees have been regularly jarred good crops of fruit have been raised. This seems to be the best mode of dealing with the curculio. The disease known as the "black knot" has also proved a serious drawback.

QUINCES.

There was a fair yield of quinces. More attention is being paid to this crop every year, and as a rule the returns are profitable. The codling moth did considerable damage during the past year, but where it

and the borer are fought vigorously the trees usually do well. The trees were also affected by leaf-blight in the season of 1889 in some sections of the state, and about one-half of the fruit dropped. What was left did not mature well. The quince requires generous culture and unless the trees are sufficiently fertilized and thoroughly examined for the insects which prey upon them, success cannot be realized. A friend planted seventy-five trees of Meech's Prolific three years ago, and writes that he has given them the best of care but the worms seem determined to have them. The Orange and Champion are the varieties most generally grown.

Meech's Prolific very much resembles the latter but is regarded as greatly its superior. It has not, however, been generally fruited in this state.

CHERRIES.

The crop of cherries was poor. Some trees bore abundantly but the fruit rotted before it could be picked, due to the exceedingly moist season. In a number of counties an inopportune frost at the time of blooming settled the fate of the cherry crop. The Early Richmond, in the opinion of the leading growers, was the only paying variety last year. Other good kinds were Black Eagle, Black Tartarian, Yellow Spanish, Downer's Late Red and Governor Wood. Our treasurer, J. Hibbard Bartram, of Chester county, is thoroughly disgusted with cherries. He has nine acres of English Morello and Early Richmond trees. The Morellos have yielded nothing in the last three years, and he is now engaged in cutting down the trees to devote the land occupied by them to more profitable uses. Sweet cherries do best with him, but the wet weather, or bugs, or birds, generally destroy the crop.

GRAPES.

At the beginning of the season the outlook for a large crop of grapes was very promising, but the lack of sunshine at the time when most needed to develop and ripen the crop caused the grapes to rot, and the results were very unsatisfactory. In very few sections of the state was there more than half a crop. Most correspondents reported failure. One gentleman who has some thirty varieties in his vineyard stated that not one variety amounted to anything. He is unable to remember of so complete a failure in an experience of many years. Some well versed vineyardists reported that the new varieties and all others dropped their leaves. The branches were small and ripened unevenly. Some good reports were received in regard to the Worden which was less affected by rot than other varieties. The Concord continues to be the standard variety, however, in Pennsylvania. One gentleman writes: "A few years ago, I thought of giving up the growing of the Concord. I have now made up my mind that if I want grapes I must grow ConCORDS." Favorable reports were also made in regard to the Brighton, Pocklington, Moore's Earley, Moore's Diamond, Empire State, and Wyoming Red. The Niagara promised well generally but was carried off with the rot. This was the experience of many growers, but in some sections the variety answered all expectations.

SMALL FRUITS.

Small fruits would have been a good crop, but too much wet weather caused much loss, and also shortened the season. Strawberries may

be put down as having been a medium crop, raspberries fair, and blackberries a big crop. Strawberries were never finer, but were inclined to be soft, on account of the excessive rains. The Sharpless held its own as one of the most profitable kinds for market, both in size of berry and the price realized. The Crescent also fully bore out its well established reputation as a variety for general crop. The Gregg raspberry continues to be highly prized by most growers, but it has a rival in the Nemaha, which is a stronger grower and said to be entirely hardy. Cuthbert continues to be the leading red berry. Raspberries were much injured in some localities by red rust and leaf blight. While the crop of blackberries was good, the quality was not up to the average. Taylor and Ancient Briton have made excellent records. Currants and gooseberries did fairly well, and were less affected by insects. All reports speak well of Fay's Prolific currant.

VEGETABLES.

It is cause for congratulation that farmers are devoting greater attention to the vegetable garden. Certain vegetables are being grown for general use which a few years ago were only to be found in the market garden. The season was fairly favorable, although too wet for some things. Late cabbage, turnips, rutabagas and celery, which run far into the season, were quite productive, and seemed to thrive all the better for the continuous rains. The season for peas was also prolonged and a second crop was gathered in the fall. The crop of early potatoes was good. There was also a large yield of late potatoes, but the crop rotted badly, especially in eastern Pennsylvania. The quality was also impaired. Tomatoes were slow in ripening, and wet weather caused them to burst their skins and decay. The canning industry is growing, and new establishments in the southeastern counties packed a large out-put of tomatoes, green corn, peas, string beans, asparagus and other vegetables.

SHRUBBERY, PLANTS AND FLOWERS.

Commendable progress is noticeable in the adornment of grounds and the making of home beautiful, not only as to the internal arrangements but as to its outward surroundings. Farmers are taking a pride in providing their homes with the comforts to be found in city mansions, and as the interior is adorned the exterior must keep pace. It is interesting to note the replies to query ten of the General Fruit Committee's circular, viz: "What progress is being made in the outward adornment of homes, and what horticultural novelties came under your notice this year?" Some of the answers to the first portion of the query are herewith given in brief form: "Largely increased interest in the adornment of our homes," writes one correspondent. "Farmers are finding out that shrubbery and flowers beautify their grounds and are planting. About the city and villages quite an interest is taken in the adornment of homes." Others write, "People are becoming generally interested in the adornment of their homes each year. Very few homes in our locality that do not have their flower gardens and shrubbery." "The homes are being well adorned with flowers and trees of all kinds." "A noticeable improvement in the outward adornment of homes." "An increasing interest is perceptible. The magnificent specimens of magnolias and flowering almond trees found in the National Cemetery, Gettysburg, are worthy of a more general cultivation on our lawns."

"Plants and flowers have a great deal of attention given them." "Decided progress, but each community should have at least one educated gardener; at present everything is at random—hit or miss." "Some homes in this county are very tastefully adorned with shrubbery." "More attention is being paid to the adornment of homes, and more shrubs and ornamentals are being planted." "I notice a growing tendency to beautify homes by growing shrubbery." "Interest is yearly increasing in shrubbery, plants and flowers." "There is a marked progress." "There are a good many hardy flowers in our county (Cumberland) and many yards are handsomely decorated." "Much attention is being given to window gardening." "A great progress." "More taste in this direction every year." "Progress very great. No special novelties, but much beauty and good taste." "Jefferson county is not behind in her shrubbery, plants and flowers, nor in the horticultural adornment of her homes." "Steady progress is plainly seen." "Most of the farmers' wives in our section (Lackawanna) look carefully after the flower garden and are indulging in quite a large variety." "Lancaster county is progressing in the cultivation of shrubbery and yard adornment and window gardening." "Shrubbery planting is on the increase." "Our people are yearly giving more attention to ornamental gardening." "McKean is progressing rapidly in this direction." "Very great improvement year after year." "Considerable progress is being made." "Every year, I think, shows some improvement in floriculture." "The cultivation of flowers both in gardens and in windows in winter time is increasing with us." "The taste for shrubbery and evergreens is increasing, and beds of dwarf evergreens and those varieties that can be readily trimmed are taking the place of carpet and other flower beds." "A growing interest in this subject attended with success. Hardy magnolias have received unusual attention with satisfactory results." "Improvement in homes and grounds is very marked. Many young farmers are showing neatness and taste in house surroundings, using hardy shrubs and flowers, and planting trees in great variety." "More and more attention is given this department every year." "The outward adornment of homes has increased at least twenty per cent." "Enterprising farmers are giving more attention to shrubbery and flowers." "More flowers are being planted than usual." "Interest in the adornment of homes is increasing." "Cultivation largely on the increase, both in town and country." From other counties (each reply above given representing one county) progress is reported, while only one or two counties report a lack of interest, which the correspondents attribute to the prevalence of hard times among farmers incident to the failure of crops and low prices.

As to the horticultural novelties very few reports were received. The decoration of farmers' door-yards seems to be drifting more in the direction of ornamental plants, such as coleus, cannas and caladiums, and flowering plants as geraniums, verbenas, and many beautiful varieties of annuals. Great interest has been aroused in the chrysanthemum family, and the gorgeously marked new varieties are being grown with success by many amateurs. Of the hardy shrubs, *Viburnum macrocephalum* is mentioned as one of the finest novelties of the season. The many beautiful species of clematis are coming into wider use, and walls, fences, and arbors are being covered with the different *loniceras*, *ampelopsis veitchii* and *ampelopsis quinquefolia*.

GENERAL OBSERVATIONS.

The year 1889 has gone on record as one of the most remarkable in the history of this country. It was a phenomenally wet year, and one of the most trying for the fruit grower and horticulturist. Up to the first of December the rainfall was fifty-eight inches, and to the end of the year sixty-four inches, exceeding all previous records of the century. It was remarkable for heavy frosts late in the spring, there having been no less than four severe frosts in May which did incalculable damage to the embryo fruit. The season was prolific in the production of mildew and rot and the growth of weeds. It was also remarkable for great floods which inundated the lowlands and swept away the husbandman's crops and stripped him of the opportunity of realizing anything as the fruit of his labor. The year ended with no frost in the ground and farmers plowing on its last day. Even at this writing, in the middle of January, the weather is as balmy as in early spring. The fruit buds are pushing and in many instances are full almost to bursting. The peaches and cherries are particularly forward, and if this ethereal mildness keeps up much longer there will be no fruit next summer. A sudden change would kill all the buds, and they are in such a condition at present that zero temperature would be fatal.

We seem to have undergone a climatic change, and various theories have been advanced to account therefor. It is claimed that the gulf stream has altered its course and is now running one hundred miles nearer the eastern shore of this country than it was one year ago. The change, it is asserted, has affected our weather, and to it is attributed the frequent and disastrous rains of last summer. Scientists are not disposed to place much faith in this theory, but all agree that there is something badly out of joint, and that our seasons are no longer as they used to be.

While the apples of Pennsylvania were imperfect, and most varieties of grapes succumbed to mildew and rot, our markets have been well supplied with fine apples from Michigan and splendid grapes from western New York. This statement is not comforting to Pennsylvania growers, but fruit loving people greatly appreciated Dame Nature's beneficence in compensating for loss in one part of the country by providing abundance elsewhere. Some of the choicest apples ever sold in eastern markets came from southern Michigan, but their keeping qualities, owing to the moist and changeable weather, were poor.

The markets of the past season have clearly demonstrated that supply and demand do not govern exclusively, for the reason that the demand for choice fruit is never supplied. Hence, quality and not quantity rules and pays the fruit grower best. It is a mistaken idea, also, that good fruit will grow on worn-out land. The soil must be good and adapted to the kind of fruit grown. Have these matters right, and there need be no fear of over-production. Grow less, and take pains to bring that which you have to the highest perfection, and you will be amply remunerated.

Peach growing can be made as successful and profitable as any branch of farm industry, provided it be given proper attention. This has been demonstrated in the Juniata and Cumberland valleys and other sections of Pennsylvania. Instances are not uncommon where the yearly profits have exceeded the whole cost of the farm, ranging from one hundred to two hundred dollars per acre. In Maryland yearly averages of one hundred dollars per acre for ten years are mentioned, the result of skill,

industry and capital. Whoever understands peach culture and attends to it well, does well. The disease known as "yellows" is the great drawback in this state. Extermination of every affected tree seems to be the only remedy. It has been discovered to be a germ disease communicable by inoculation.

Casper Hiller, one of the Lancaster county correspondents, whose esteemed acquaintanceship we have enjoyed for many years, relies upon "bagging" to produce nice grapes in all seasons. Rot was the prevailing trouble with him last year. He writes:—"Nearly all varieties fared badly. Concord, Clinton, and Telegraph, which used to be regarded as ironclads, rotted as badly as Worden, Roger's Hybrids, Niagara, etc. Moore's Early, Pocklington and Jefferson came out best. Strange, too, that Jefferson should come out best of all! It is a late bloomer and escaped the rain storm." He gives his experience in regard to strawberries by saying that the "Crescent for several years past produced two or three quarts, where three or more of the best varieties made one quart." In regard to pears, he says: "The Kieffer, although not of the best eating quality, is becoming more popular every year. Bad seasons affect it very little. Its large size, fine appearance, its productiveness and fine preserving, canning and cooking qualities speak much in its favor."

Oliver D. Schock, of Berks (northern district), writes: "Personal observations in all parts of the state during the year have convinced the writer of the fact that locations and soils should be invariably considered in a scientific and practical light and less failures would be the rule."

M. T. Donmoyer, of Berks county (eastern district), writes: "Some time ago I read in a fruit journal: 'How can we prevent our apple trees from overbearing one season and the next having no fruit at all?' My experience is as follows: In 1886 I budded two branches, or one side, of a crab apple tree with buds from a Tetofsky apple. Two years later I budded the other half. The result is one side bears each season, while no blossoms appear on the other side. The question now is how long will this continue?" Mr. Donmoyer intends prosecuting his investigations and give the public the benefit thereof.

O. R. Shearer, of Berks county (central district), says: "The only new fruit worthy of mention is the Yellow Transparent apple, which promises to be the coming early apple."

Prof. George C. Butz, of State College, Centre county, writes: "The Mikado is tasteless, and should be used only as a 'stock.' This was a bad season for fruits, but good for vegetables. In June we were entertained with the song of the seventeen-year cicada in this county."

J. Hibberd Bartram, of Chester county, reports: "The season was certainly too wet for the fruit to do its best. We had a storm in the early part of the season that destroyed much of the fruit (especially apples and cherries), and in the fall the late peaches were entirely ruined with the continued rains."

Thomas Cheyney, of West Chester, advises all who have small lawns to plant *hydrangea paniculata grandiflora*, *Itea virginica* and *Viburnum plicatum*, as they are certainly amongst the finest of our hardy shrubs.

J. Herr, of Clinton, recommends spraying, and says: "Those who have sprayed their fruit trees succeeded to a considerable extent in raising fruit. The wet season prevented catching the curculio during its season."

A. C. Sisson, of Lackawanna, and John Hoffa, of Northumberland, are also earnest advocates of spraying. The latter writes: "I had more apples than any ten farmers in our township. I used the Field's spraying pump in my apple and pear orchards, and had a fair average crop of fine quality. I am satisfied that we must fight the insects the same as we do the potato bugs. I hope this matter will be fully discussed at our annual meeting."

D. F. Good, of Lock Haven, writes: "I noticed that the wet weather was hard on all *white* grapes and that they were blasted in the blossom. The grapes were free of disease so far as I observed. Of a dozen or more varieties on my grounds, the Worden was the best. The Brighton was good but it is a little tender. I saw some Niagaras on a neighbors grounds. Mine were frozen in blossom."

George W. Owens, of Huntingdon county, reports: "The Grimes Golden apple is comparatively new here, and is proving to be a choice table and cooking fruit. The codling moth as usual injured the fruit."

Ex-President Calvin Cooper, of Lancaster county, says: "The unprecedented rainfall has been against the horticulturist. While agricultural products were very abundant the horticultural department suffered. Rot, mildew, and other consequences of excessive moisture seem to have been the cause."

R. F. Schwarz, of Monroe, found last year the Sharpless to be the best strawberry of twenty varieties grown by him. The Haverland proved the earliest. Belmont, Warfield and Cloud were all good.

Thomas F. Bachman, of Northampton, reports favorably in regard to the Brighton, Empire State, Jefferson, Moore's Early, and Vergennes varieties of grapes, which proved to be the best of the newer kinds in his experience. The Japan plum was a total failure with him.

Thomas B. Meehan, of Germantown, writes: "We think the general failure of the fruit crop can be traced to the extra amount of rain this season."

Hon. Edgar Pinchot, of Pike, says that the crop of quince was the most satisfactory in the fruit department in his county in 1889. The old Apple and the Champion were the varieties which did best. The former proved to be the most desirable for both market purposes and home use.

E. O. Austin, of Potter county, writes: "It has been a season of unprecedented rain, and very unfavorable to all plants except those which require much moisture. Except the cut worm and wire worm no other insects or their larvæ have had a chance this year, if we except the potato bug, which has "all seasons for its own."

Mr. Austin, also, in referring to the total failure of apples pears and cherries, says: "No county in the state is better adapted to these fruits than this, and generally the supply is so abundant as to be hardly worth marketing. Every farmer and every person who has land enough has an orchard of fairly select fruit."

Some orchards are very large and productive, but lack of railroad facilities is a great embarrassment. Several years ago I found an orchard yielding some 30,000 bushels of apples."

S. M. Baker, of Tioga, reports that the frosts in the spring killed almost everything in his county. "There was a yellow and brown striped worm made its appearance, feeding on cabbage and leaves of trees and buckwheat."

James Miller, of Venango county, heard a number of complaints in regard to snails having been very numerous and injurious to some plant.

L. M. Hazeltine, of Warren county, who raises small fruits for market, writes that currants paid him best this year, although the worms were more troublesome than ever before. He also says: "I find the Crescent strawberry the most profitable of any, yielding double the quantity per acre as such varieties as Jessie, Sharpless and Cumberland."

Theodore Day, of Wayne county, reports that the late frost in May or blossom blight, probably both, destroyed the fruit blossoms on his new varieties. He planted beans and corn in the mud with a hand planter, leaving some of the seeds visible but they came up and did well. He could not use a hoe in planting owing to the wet weather. A small bug or large flea beetle damaged blackberry vines, and also young fruit trees, eating the buds of cherry, quince and other trees.

N. F. Underwood, also of Wayne, says that there was more fruit in 1889, as well as in the previous year, on the hills than in the valleys.

Dr. W. S. Roland, of York, writes: "Fruits of all kinds were more or less injured by the continuous wet weather, and the season of duration was also shortened from the same cause. The wet weather was injurious to the quality of vegetables, especially potatoes which I consider the chief of the family."

S. F. Larkin, of Delaware county, says that a bad practice with nurserymen and others is confusion of names. He mentions three excellent varieties of cherries, styled locally May Bigarreau, Black Hawk, and Broomall, which are not known to orchardists, and says that even the Delaware Bleeding Heart is unknown to nurserymen.

W. F. Fisher, of Centre county, mentioned the following fruits as having done well last year, notwithstanding the season's disadvantages: The Baldwin apple, Bartlett pear, German prune, and Lombard plum, Orange quince, Kentish, Black Tartarian, May Duke, and Black Eagle cherries, and Concord and Worden grapes.

J. W. Pyle, of Chester county, finds the Victoria the most profitable currant for general purposes. The Taylor is his preference as a blackberry for family use. He had a big yield of strawberries of poorly-flavored fruit, as there was but little sunshine and too much rain. Sharpless generally yielded poorly. Crescent was a good crop. Bubach No. 5 yielded well, and he considers that variety as fine as Sharpless and a good bearer. All varieties of grapes were a failure with him. All rotted, even those that were bagged.

J. E. Jamison of Juniata county, reports specially on the peach crop in the Juniata valley, as follows: "The peach crop was almost an entire failure; it was in fact the shortest crop we have had in Juniata for many years in comparison with the number of trees under cultivation. Only about 10,000 boxes were produced all told, which is only one-tenth what the crop should have been. Yet, although the crop was a failure, some few orchards produced some fine crops of good fruit, while others adjoining were almost bare. The varieties doing the best were Smock Free, and Salway. The cause of our failure was a soft, open winter which caused the buds to swell, followed by a slight shower of rain on the night of February 17, that froze about nineteen-twentieths of the buds. The quality of the fruit was good when not injured by excessive wet weather during the ripening season. The prices realized ranged from one dollar and twenty-five cents to four dollars per box. After another year's experience I am convinced, from the continued growing demand for our fruit, that sooner or later Juniata is to be the greatest peach-growing center of Pennsylvania. According to the

quantity of peach trees planted annually, and especially in the spring of 1889, namely 165,000 trees, the growing of peaches has aroused unusual interest; and further I am fully convinced that the day is far distant when our markets will be overstocked with good peaches."

W. B. K. Johnson, of Lehigh county, gives his experience in grape culture during the past season. He says: "Out of about seventy varieties there were only some sixteen that had full or nearly full crops. The others ranged in loss from five per cent. to the total crop. Among the best varieties were: Worden, Telegraph, Moore's Early, Hartford Prolific, Highland, Pocklington, Ulster Prolific, Poughkeepsie Red, Beauty, Dracut Amber, Wyoming Red, Lady Washington, Jefferson, Brighton, Duchess and Vergennes. Among those promising, but vines light some being quite new, may be mentioned: Eaton, Etta, Hayes, Jessica, Norwood, Triumph, Moyer and Moore's Diamond. Of those showing a loss of ten to fifty per cent. were, Black Eagle, Cottage, Concord, Lindley, Merrimac, Owasso, Pearl, Salem and Wilder. Of those showing a loss of fifty to one hundred per cent were, Amber Queen (total), Bacchus (total), Early Victor (total), El Dorado (total), Elvira (total), Niagara (total), Noah (total). I used Bordeaux Mixture, as per formula from Washington, and, in fact, I was troubled very little more by black rot than in former years. Many vines were entirely free, while others were affected to the extent probably of five per cent. On some the grape fruit worm (*Lobesia votrana*) operated, but only on certain varieties. However, what ruined my crop was the "brown rot;" and I believe, though science may differ, that this particular season was an exception. The heavy and continual rains kept the ground so wet that the sap in the vine was too watery, forcing itself into the grape, and thus the grape wet from day to day, the juice could not evaporate, and the water in the fruit caused a discoloration of the pulp, and this drew to the surface and caused the rot. I examined some grapes under a strong magnifying glass, but no defect could be discovered. I then cut them through, and the pulp was noticed under the glass to discolor. Upon making this discovery, I cut away the leaves on my vines, so as to expose the fruit to the morning sun, and I saved some of my grapes, but was too late to save the entire crop."

Your chairman cannot conclude this report without alluding feelingly to the changes that have taken place in the General Fruit Committee, since his appointment some years ago. While the committee has grown to thrice its former size, it has lost a number of its members through death, resignations and otherwise. During the past year some useful members who were ardently devoted to the cause of fruit growing were called to the great beyond. We sincerely deplore the loss which we have sustained, as their advice and suggestions were always valuable. Several members whose advanced years and increasing infirmities have admonished them to seek rest and quiet, have notified your chairman of their desire to retire, and have named younger persons to succeed them. May these venerable fathers in fruit culture know naught but peace in their latter days.

On motion, report was read and general discussion invited.

Mr. ENGLE. This report by Mr. Fox is one of the most complete of the many excellent reports he has submitted to our association. While it is replete with general and practical information, I was struck with the fact that much is yet to be learned by the horticulturist. It seems strange that orchards side by side, apparently in similar soils and similarly treated, are so differently affected.

This is one of the wide fields that horticulturists might explore with profit. I think altitude is one of the considerations, though friend Meehan sometimes differs; so far as my observation goes higher altitudes are generally more safe from frosts and sudden changes in the atmosphere.

Mr. THOMAS. This is a valuable paper and merits a general and thorough discussion. I find the peach one of the leading fruits for profit, and have had more success with this than any other fruit.

If nurserymen would study more carefully the adaptation of varieties much would be gained. Local varieties usually succeed best where they originate. My own residence is in a valley with northern slope. In 1879 or 1880 few buds came out in the valley, while on top of the mountain large crops of fruit were produced.

Mr. MEEHAN. My friend Mr. Engle refers to difference in altitude, though I don't believe that there is as much difference as he thinks. I may have said that altitude alone is not the cause of failure. Sometimes it is attributed to frost when the cause is something else. Sometimes the absence of bees, or the absence of pollen at the proper time are causes of failure. I have noticed in recent years that some seasons pollen and pistil do not mature at same time. In some instances male flowers have matured in December, while the female flowers were not ready until May. The inference is that certain temperatures will effect female but not the male flowers. It is this variation that has just as much to do with short crops as frost. Another question is the vital power of flowers themselves. When a tree has not the vitality to lay up nutrition, its crop will be a failure. It is well to consider that not one circumstance alone, but a number of causes may combine to effect failure in our fruit crops.

Mr. BRINSER. In regard to growing peaches on high or low land, we know that the soil in the valleys is deeper and richer than on the hill tops, and that the richer the land the stronger the tree, but the less likely to mature fruit buds. On high grounds soil is more likely to be poor, and consequently more likely to develop fruit buds.

Mr. DAVIS. I think the experience of peach growers in Juniata county will contradict Mr. Brinser's theory. Every fruit grower present can get up and tell a different experience. All we can do is to use the knowledge we have gained by experience. While on the floor I wish to call attention to the neglect of apple culture in this section, which is a mistake. Our fruit growers say they want quick returns and cannot wait for apples. I think the salvation of the apple crop depends upon spraying the trees. Whenever tried this has proven successful in growing fine fruit. I would give more for an ounce of practice than for ten pounds of theory. The mistake of our Juniata county people is in neglecting everything for peach culture.

Prof. BUTZ. It has been suggested that the General Fruit Committee get statistics as to the exposure or elevation of orchards. Such data would be valuable. The peach is deciduous, maturing in one season, its bearing wood for the next, and when growth is vigorous and rapid there is a tendency to form stem and leaf, instead of fruit buds. So in all kinds of vegetation, if we arrest the flow of sap we increase the prospect for fruit.

Mr. DAVIS. I wish to mention a fact in regard to pear trees that may be of interest. In the farm where I was raised there were several trees that did not bear, and we were told that to check the growth would

cause fruit buds to form. We cut or girdled the trees and they bore that season and have borne ever since.

Mr. MEEHAN. A neighbor has a pear tree such as Mr. Davis describes, one branch of which has borne fruit regularly for five or six years while the balance of the tree bore nothing. The tree was examined and it was found that the label wire had been left on the branch referred to, cutting into the bark and checking the growth. This proves the principle that has been advanced. No tree bears until a portion of its early vigor of growth has been exhausted. By girdling or putting wire around or not giving any manure we develop reproductive growth.

Mr. WOODS. If we are only content to wait until our trees are matured they will generally go into bearing. So I would say to Mr. Davis wait until active wood growth is over and they will bear abundantly. In 1876 storm partly blew out some trees in an apple orchard and they bore finely afterward.

Prof. HEIGES. During the last six or eight years I have given more attention to potatoes than anything else, and have found considerable difficulty in cross fertilization. I very often found that the stigma had matured before long the pollen. I wish to say in reference to report of the chairman of General Fruit Committee that it is one of the most satisfactory and exhaustive that I have ever heard, and I move a vote of thanks for his admirable paper.

Mr. MEEHAN. I want to second the motion just made, and to say that I have never heard so full and complete a report.

Prof. Heiges' motion was adopted unanimously.

The PRESIDENT. Mr. Brinser has prepared a report on small fruits which would be now in order.

Mr. FOX. I hope Mr. Brinser's paper will be read. I have his sub-report with me and intended to have it read.

The PRESIDENT. I have visited Mr. Brinser's place, and he is one of the most successful and practical fruit growers in the State.

The following paper was then read:

REPORT ON STRAWBERRIES, RASPBERRIES AND BLACKBERRIES FOR 1889.

The season was very favorable at the time. Berries were blossoming and the set of fruit was good. The season was unusually early—the first ripe berries picked May 23. On the 30th of May and 1st of June we had the memorable floods which damaged the then ripening berries to a great extent. The berries, however, not in the stage of ripening at this time reached a point of perfection not easily eclipsed—many of the large berries being six inches and over in circumference, and so highly colored that an artist could scarcely have made much improvement. I feel sure there never was a larger crop in this part of the country, and yet we cannot near reach the quantity reported by some.

As to varieties with me I beg leave to report as follows:

Monmouth, a staminate, a new variety of recent introduction is the earliest large strawberry that I have found in my trials (which are not a few). It is a good strong grower, healthy foliage, the fruit very firm, very good, highly colored, round in form, rather sharp point for so a large a berry, very prolific and large size (averaging as large as the Cumberland). While the Crescent and M. King may ripen a few berries as early as Monmouth, they do not ripen in quantity sufficient to compete with it by three or four days.

May King, a staminate, is also of rather late introduction. A very

strong grower, very healthy foliage and very productive. It may be classed among the very early kinds. If properly grown the fruit is of rather large size and so firm that if hauled around a whole day they are still in good condition; of very good quality and very much liked for preserving. The color is rather pale, but this overlooked on account of its other good qualities.

Jessie (staminate), this is of recent introduction and a good strong grower of healthy foliage. The fruit is of the very highest quality; the shape much like the Sharpless, but ripens all over; nearly as large as Sharpless, but sets fruit thicker. It is very firm and ripens midseason. I think it will bear a great deal of feed, but if properly cared for it will produce heavy crops of berries.

Bubach (pistillate). It is a good strong grower. None other has healthier foliage. If one desires a berry of extreme large size and quantity this is the one to plant. Had it the firmness and quality of Jessie or Sharpless it would eclipse anything I have yet tried, but it lacks in these two essentials. On the whole it is a good berry to grow as it fills the boxes and they in return fill the purse.

Gandy's Prize (staminate). A new variety, a strong grower, healthy foliage and the latest of all I tried. The berry is of good form, highly colored, firm, good quality but I fear not as productive as one could wish, but coming as late as it does, it will sell at a price that may make up for quantity.

Cumberland, an old variety, and one that has given me good returns: much liked by consumers, very productive, but partially failed last season, the cause unknown.

Sharpless, this is so well known that it needs no description only to say that if I was compelled to have but one variety it would be Sharpless. It seems to be at home in my soil. The berries are of such extreme size, good quality and beauty, that it sells for more money than any other with the exception of the first pickings of the early kinds. I am satisfied it has made more money under the same treatment than any other I have, especially in the last two years. Being an early bloomer it sometimes gets caught in late frosts, and my experience has led me to believe it to be tender in this respect. The Jessie seems to bear more frost than any other of about seventeen varieties I had in 1888, when we had the heavy frost about May 17.

Raspberries yielded fairly, but suffered considerable from excessive rains. In reds I have Hansell for early. It is not a strong grower, but a good bearer, and, coming in as early as it does, finds ready sale at a fair price. Cuthbert, however, outyields every thing we have and the berry is of such fine size, good and firm quality that it can easily be termed the leading red berry.

Shaeffer's Colossal which I believe is classed among the reds is a cap variety. It is the strongest grower of any variety I yet saw, a wonderful bearer of very large berries of a purplish color. The quality to my taste is very good—in fact I think the best but being too soft for distant shipment which seems to be its main fault.

In the black caps Gregg has so far been my best paying crop being of the largest size, good quality and good bearers, but is not hardy enough to stand a very cold winter. This we hope to overcome by using the Nemaha which is about the same kind of a berry, only a little larger and stronger grower. Its hardiness I have not been able to test fully as the last few winters have not been cold enough to freeze the Gregg in the same place.

Souhegan is the earliest I have, but is not an upright grower enough to please me. It is a prolific bearer, but the berry while being fair size at first picking, closes out too small. Hillborn comes in only two or three days later and is such a luxuriant upright grower and the berry larger, a heavy bearer of the finest fruit I ever saw, that I think the day is not far distant when the Souhegan will have to take a back seat.

I have an ever-bearing variety the name of which I don't know, that bears a good crop of fine early berries of the finest quality (the flavor coming nearer the flavor to that of the wild berry than any other) besides furnishing berries right along all summer till in the autumn month.

In blackberries Early Harvest is the earliest. The berry is medium in size, fine appearance, good quality, and has no competitor in market owing to its earliness.

Kittatinny is a good bearer of fine fruit, good quality but subject to rust. Erie is a good strong grower, said to be hardy, fruit of large size, fine form and good quality. Wilson, Jr., is a large berry and very productive but the quality during last season has been so inferior, besides the plant being a poor grower, that if another season's trial will not show a decided improvement I will discard it as no good. Snyder is a good grower very productive (inclined to overbear), but fruit rather small size and inclined to turn red.

Taylor is one of the best. A strong grower, wonderfully productive, hardly so far with me, berry medium size but of the highest quality. For eating I prefer the Taylor to any other I have tested.

Mr. MEEHAN. I must apologize for rising so often, but if there is no objection I wish to say a few words concerning a matter referred to by Mr. Brinser. He states that Sharpless is the most satisfactory strawberry of all, and that is also the experience of others. Of some eighteen or twenty kinds we grow it is the best. Others seem to degenerate, why we do not know, but Sharpless still holds its own. Wilson's Albany has degenerated and is almost unknown. Strawberries are subject to a leaf blight or fungus peculiar to themselves, but Sharpless seems to have more power to resist this disease than most other varieties.

As soon as anyone has a variety that is seriously affected by leaf blight or rust it should be discarded. Whenever strawberries lose their leaves they lose vital power. If an osage orange hedge is pruned regularly it will not grow large. If not pruned it will grow large. The point I make is simply that Sharpless is good and productive because it has not blighted like many other kinds.

Mr. DAVIS. I would like to know more about Shaffer's Colossal raspberry. Is it yellow?

Mr. BRINSER. It is dark red, darker than Cuthbert. When fully ripe it is too soft for shipment but good for home market. It is the strongest grower and heaviest cropper I have ever had. Fruit large and abundant, flavor sub-acid but when accustomed to them, customers prefer them to any other variety. I think for a home market they can be grown as profitably at eight and one-third cents per basket as any black caps at ten cents.

Mr. Davis asked for further particulars concerning Mr Brinser's Everbearing raspberry.

Mr. BRINSER. It ripens its first crop a few days later than Souhegan, and yields a few berries along until autumn. Can pick twice a week

but not in any quantity. When weather gets cool berries are not highly flavored. The fruit is produced on new canes which are constantly coming up.

Mr. LANTZ. Mr. Brinser has told us about some new varieties of raspberries, but has said nothing about one of the best we have here, the Ohio. It is our best and hardiest variety.

Mr. BRINSER. I have not fruited it.

Mr. ENGLE. We do not think as much of Ohio as some other varieties. As for the "Everbearing" variety it is of very little value. I have tried "Catawissa," "Ohio Everbearing," and "Marvel of Four Seasons," and have abandoned all of them. They bear a few berries along during the season, but are more of a novelty than of any value for profit. During the past season "Hansell" has produced later or second crop, owing no doubt to the mild autumn weather. When first introduced I thought the "Everbearing" varieties were a great acquisition but I consider them of little or no value. In reference to "Shaffer's Colossal" we consider it a very valuable variety. It is not attractive in color but an extraordinary bearer and one of the very best for preserving. Sharpless is still our leading strawberry. Have had nothing yet to supersede it.

The PRESIDENT. I have always pinned my faith to Sharpless, but last season two thirds of its blossoms were abortive.

Mr. MEEHAN. Where raspberries are attacked by rust or fungus they lose vigor and power to resist low temperature. In cold climates this fungus never attacks them, and I have gathered raspberries within 500 miles of Behrings straits. I have here a branch of Hackberry cut from a small tree in your town. Part of this branch is attacked by fungus and dead. Its vital power is so low that it has already been killed by the cold weather, though the winter thus far has been unusually mild.

Mr. BRINSER. I sometimes wonder whether we don't interfere with instead of assisting nature. We have been taught to cut back Raspberry canes to make laterals. Part of planting was tipped, and part left grow and the latter matured much better than those that were cut back.

Mr. McWILLIAMS. What fertilizers are used, and what is your method of culture especially for strawberries?

Mr. BRINSER. I prepare the ground well, fertilizing with barn-yard manure, give good cultivation and mulch for winter. Plant in rows three feet apart, one and half to two feet on row. If ground is adapted would checker three and one-half by two and one-half feet and work both ways; can by this method form matted rows with less hand culture.

Straw manure is the best mulched we can apply, We use barn-yard manure in preparing the ground, then wood ashes and ground bone.

Mr. JAMESON. When is the mulch applied?

Mr. BRINSER. Just as soon as the ground is frozen sufficiently to bear horses and wagon. Mine are not all mulched yet, as there has been but little freezing weather. I do not favor cultivating in spring before fruiting. Shall from now on plant a new bed every spring, in preference to renewing old beds.

Mr. JAMISON. I have seen beds of Sharpless in our section, a complete failure. Crescent will do in almost any soil.

Mr. THOMAS. I am satisfied it is the true way to plant a new bed every year. What is the quality of Crescent strawberry?

Mr. JAMISON. Sour as Wilson, but as for myself I like it better than any other variety.

Mr. LANTZ. Last year I grew Crescent, May King and Garretson, my children would not eat Crescent or Garretson. Wanted May King and Sharpless.

Mr. BRINSER. When we grow fruit we grow for our customers and what will bring most money Crescent is not equal in size to others, and so extremely sour that customers do not like it, nor do I care for it myself.

I must sell two quarts of Crescent for what I get for one of Sharpless, Cumberland, Monmouth and other varieties. Monmouth is a fine berry, high color, as large as Cumberland and bears in great quantities. For main crops and for profit Sharpless is best. I know nothing about Kentucky.

Mr. WOODS. It is one of Mr. Heister's leading berries.

Mr. THOMAS. Chas. Downing is one of my most favored varieties, and too good to discard. As to Kieffer pear, it seems to me that it is one of the best, one of the "stand-bys" as it were. The more I see of it the more I believe it is one of the best varieties to plant.

Mr. JAMISON. It was among the best I had the past season, and I will not allow any one to abuse it any longer.

The PRESIDENT. Of grapes I had only two varieties that came to perfection last season, Cottage and Moore's Early. Cottage is one of the best I have. It is a day or two later than Moore's Early, equal to it and better than Concord in quality. Foliage healthy and no rot, while Concord nearly all rotted.

Mr. BRINSER. Mr. Kready has grown Cottage. Let us hear from him.

Mr. KREADY. Have grown Cottage eight or nine years and always among the best in quality. It is equal to Worden and eight to ten days earlier. Last season it failed as did some others. Drops from the bunch when fully ripe. Concord is running out and we should try new varieties. I am introducing some new varieties that promise well, Early Keystone, Early Daisy and Early Concord. Last season Early Daisy proved all right showing no rot. Early Keystone comes next in value.

Mr. McWILLIAMS. At Lewistown last winter some one spoke of wine that did not ferment. Has any one had any similar experience

Mr. ENGLE. The wine referred to did finally ferment after three or four years. The grapes from which this wine was made were grown under most favorable circumstances.

The PRESIDENT. Some years ago I had a fine crop of Clintons I took the juice added some sugar, put into stone jars and it never fermented.

Mr. ENGLE. I have tried a number of grapes, thirty or more varieties, and have had but one variety that grew to perfection without care, and that was "Ives Seedling." It will I believe stand more hardship than any other kind.

Mr. DAVIS. I have a dozen varieties or so, and all rot. The only instance where they did not rot, was where the vines ran up into a tree. In town there was less rot than with us, but there was considerable last season everywhere. We tried bagging with no better results, though perhaps the bags were put on too late

Mr. WOODS. I don't grow grapes myself, but sell vines and hear many reports of failures. Persons generally say they do no good and threaten to dig up their vines. I find vineyards generally planted on elevated

places and where they are protected. If, instead, they had selected a brow of a hill on north side where all the snow blew off they would succeed better. They should plant where there is a current of air and no protection.

Mr. JAMISON. I fear grape culture in our county is doomed. One year we succeeded by bagging. Last year it was neglected. Will try again and if that will not do will give it up.

The PRESIDENT. Last season bagging did no good. Too much wet weather which kept bags constantly wet.

Prof. BUTZ. In 1888 we had some experience in spraying trees and vines, but last season had no material to work on.

We have heard also from other stations, and bulk of testimony is in favor of spraying, though some report no difference. One-half pound Paris green, or London purple, to one hundred gallons of water is plenty strong enough to destroy insects. One pound to one hundred gallons has in some instances destroyed the foliage.

Mr. WOODS. Could we not get better results by combating insects in winter? The codling moth for instance.

Prof. BUTZ. When the codling moth leaves the apple it seeks a place to stay for the winter, where it can hide and form cocoons. Some tie bands of straw around the trees for that purpose. In spring they can also be found in crevices of the bark and destroyed before the moths are formed.

Mr. LEONARD. I have been spraying fruit trees for three or four years. Last year was a failure because too much rain. The previous year nearly every apple was free from codling moth and it was an entire success. I used a "Field force pump" mounted on a wagon driving up one side of row and down the other. I applied one-half pound London purple to one hundred and twenty gallons water. If trees are not large it is not necessary to drive on both sides.

Mr. ENGLE. In 1888 we sprayed our apple trees and it proved quite a success, our fruit being much finer than that of our neighbors. Last year we had only a light crop and did not give it much attention. Two sprayings, if well done, will answer.

Mr. BRINSER. Two years ago I sprayed my apple trees and had a most excellent crop. Fruit in other orchards was not so fine and we attributed this to the fact of their not being sprayed. Last season was too wet, poison being washed off. It was an "off year" for apples and the same number of codling moth would do more damage than when we had a full crop. If we have much wet weather would rather spray four times than twice in a season. On the whole I am convinced that spraying is advisable.

Mr. DAVIS. The apples which I have placed on exhibition are from an orchard in which cows, sheep and hogs run all season. No worms are allowed to mature there. Another orchard in this county in which hogs are always allowed to run at large, has had no total failure of fruit in six or eight years.

Mr. BRINSER. In reference to grape rot, I saw an article by Judge Miller of Missouri stating that rot could be prevented by cutting back all vines to the ground and growing no fruit for a season. Now we have the facts, what is the theory.

Mr. ENGLE. The theory no doubt is that the spores or germs that produce rot will not live over the season.

Mr. LANTZ. I have cut off my vines above ground and found no difference. Last year I did not have enough grapes to eat.

Mr. McWILLIAMS. I was in Blair county several year ago and saw a party there who had no grapes, except where his vines ran upon the tree tops. This seems to be in support of Mr. Wood's theory. In foreign countries grapes succeed best on hillsides and on trees, and it seems evident that we want them up out of the reach of moisture.

Mr. MEEHAN. When Benjamin Franklin was in Paris some one in the academy asked him why two fishes placed in a bucket even full of water did not cause it to run over. When Franklin tried the experiment the water did run over. So I prefer to have my own facts rather than the assertions of others. The grape, like the osage orange, if constantly trimmed and pruned is always weakened, and where vines are trained to stakes or trellises they are more liable to disease than when run up on tree or building. Another point might be explained. All motion is a tax on nutrition. The tendrils on vines live ten days in their effort to find something to cling to. If in that time it finds nothing to cling to it dies. This effort requires more plant food. There is no waste of nutrition where vines run on trees and tendrils at once cling to the branches. Old gardeners often cut off all tendrils as soon as they appear, though they do not always know that it saves the power and vital force of their vines.

On motion of Mr. Thomas the hours for meeting were fixed as follows: 9 A. M. and 2.30 and 7.30 P. M.

The president appointed the following committee on nominations: Jamison, Fox, Yeager, Pannebaker and Brinser.

EVENING SESSION.

Being called to order by the president, the association was cordially welcomed to Mifflintown and Juniata county, by George Jacobs, Esq. in the following:

ADDRESS OF WELCOME.

Gentlemen of the State Horticultural Society:

It is with a pleasant form of pride and gratitude that we extend you a welcome to Mifflintown and Juniata county. You are the most honored guest we have ever entertained. You are a band of nature's noblemen whose study and inspiration is nature. You adhere together through no selfish motive, you aim alone to discover and to use the resources of nature and thus to benefit your day and generation.

I am aware of this fact that your places of meeting in the past, have ordinarily been the large and beautiful cities of our old commonwealth where the inspiration of urban hospitality has pleasantly colored and eloquently endowed all your utterances. Why, then, have you, in 1890, over looked Philadelphia with her innumerable attractions? Why have you gone by Pittsburgh where natural gas has turned winter into summer, night into day? Why have you passed by our beautiful capital city and Wikesbarre, the home of the dusky diamond, and Allentown, and Reading, two cities which have their own peculiar menu? Why have you gone by all these bright spots and come rather to Mifflin, the capital of all but the smallest county in the state? Was it the musical name of the Juniata, made famous the world over, by the song of the

Indian maiden? Was it the modest lovely scenery of the river which charmed and drew you? No, no, the music of the name may delight you; the scenery of the river may enchant you, but the honor you have done us is significant of greater things. It means that Juniata county, once known only as the namesake of the river, is now known for its own sake. It means that your society has discovered here some of its most progressive ardent votaries. It means that Juniata county has been about the first county in our great state to recognize the impossibility of successful competition in the line of cereal cultivation with the cheap lands of the boundless west, and turn into other and more remunerative paths. It means that Juniata county has turned her briery stone clad and neglected hillsides into fertile, mellow gardens from which she annually reaps an ever growing harvest of luscious wealth. It means that Juniata county, in area one of the smallest in the galaxy of counties, in fruit culture has become about the largest in Pennsylvania. It means that the peninsular orchards are rapidly on the decline and that Juniata fruit is supplanting peninsula fruit in the markets of the world.

Your visit here is freighted with all this significance to our good people and can you wonder than that you are welcome.

Many, many times welcome. Proceed then with your deliberations, assured of the fact that our sympathies summoned you, and if with nature's brush you can touch with a deeper tinge the blushing cheek of yonder peach, or if with nature's chisel you can add one more line of beauty to the already graceful proportions of yonder tree, or if with nature's chemistry you can instill a richer flavor to yonder fruit, then have you "made two blades of grass to grow where but one grew before," and you are benefactors indeed.

RESPONSE BY PROF. S. B. HEIGES, OF YORK.

Ladies and Gentlemen, of Mifflintown and Juniata County:

In behalf of the State Horticultural Association of Pennsylvania, I thank you for your cordial welcome.

It seemed a mystery to me why two of our meetings in succession should be held in the same neighborhood.

Probably as one of my little children remarked to her sister, who had mumps on both sides "We wanted you to have it good."

We have come again, because the invitation was so genuine and cordial.

We have met in Reading, Philadelphia, Lebanon, York, Harrisburg and other cities of Pennsylvania, and whilst we always met with a generous welcome, we thought it best to rear our tents in the valley of the Juniata.

You have here large and fruitful orchards and every facility for prompt and rapid shipments of your valuable products.

Your rock-ribbed mountains have for ages by their slow disintegration furnished the minerals so essential to profitable peach culture. Your giant trees by their annual deposit of leaves have, too, paid tribute in providing other essential elements of plant-life.

Nowhere else in our noble commonwealth can be found a section that rivals the once famous regions of Maryland, Delaware and New Jersey.

Your praises will yet be sung by countless thousands to whom you will send the luscious peach of the Juniata valley.

We are not selfish, therefore we have come to discuss with you our successes and failures, our profits and losses our modes and methods.

We accept your words of hospitality and kindness, and hope our coming here will be productive of good.

The PRESIDENT. We have with us this evening, Prof. Armsby, Director of the Agricultural Experiment Station at State College, Pa.; and Dr. B. H. Warren of West Chester, Ornithologist to the State Board of Agriculture. As these gentlemen cannot remain with us to-morrow, we will modify somewhat our printed programme, and have their addresses this evening. I now have the pleasure of presenting Prof. Armsby, who will speak on "The Work of Experiment Stations in Horticulture."

Prof. ARMSBY. Mr President and members of the State Horticultural Association of Pennsylvania, it gives me great pleasure to meet with and address you, though I confess to some perplexity as to my subject, as I am not a horticulturist. Your secretary has urged me to say a few words on horticultural work at experiment stations, and I will endeavor to do so not so much because of anything important I may have to say, as because of my interest in your work and in your society.

First, as to varieties and their adaptation to local conditions. This was perhaps the most obvious field of work for the Stations and has received a good deal of attention. While opinions of dealers are not disinterested, we still may take them as in the main correct. Our own station is now testing, on considerable scale, garden vegetables, and publishing reports from time to time. We are specially engaged in the more important object of testing new varieties. At a meeting of representatives of experiment stations held at Knoxville, a year ago, a general line of work was agreed upon. Thus far the public has had no opportunity to test new varieties without considerable expense, while on the other hand the dealer is at a disadvantage because of the suspicion that he is offering them more for personal profit than for any special merit they possess. It is desirable also that new varieties be tested at different stations, so that their adaptation for general cultivation may be satisfactorily established. The stations, in testing new varieties, keep a list of the originators, and will not purchase, but will accept new varieties for trial. They will cultivate them by the side of standard varieties, and results will be reported to the originator in the monthly bulletin and in reports to the Department of Agriculture. We further say to the originator we will not sell or distribute or give away except to give to other stations. We do not agree to protect originators against loss by theft. Will simply report to them and to the public the facts. Will not recommend, but leave those interested to draw their own conclusions.

In testing new strawberries we require twenty-four plants, of new vegetables, enough seed to make fifty feet of row, etc. The Department of Agriculture furnishes blank forms for reports of observations both to originators and to the public. Another point is the question of nomenclature. The stations are trying to effect a reform in this direction, not only in fruits, but in vegetables, and I submit herewith report of a committee appointed at a meeting of station horticulturists held in Columbus, Ohio, in June, 1889.

Said committee submitted the following report and rules.

REPORT OF COMMITTEE.

"The committee believe that all interests will be subserved and that dignity will be secured, by simplicity and good taste in the nomenclature of kitchen-garden vegetables. To this end they have formulated a series of rules on the naming of vegetables, by authority from the convention of horticulturists of the experiment stations held in Columbus, Ohio, on the 13th and 14th of June last.

"Reform in this department of horticultural nomenclature should be prosecuted as vigorously and successfully as it has been in the nomenclature of fruits at the hands of the American Pomological Society. The committee are confident that brevity, accuracy, and good taste in the naming of vegetables are perfectly compatible with the purposes of trade, and therefore solicit coöperation in this work not only from all writers upon horticultural topics but also from all dealers in garden seeds and supplies.

"A name is bestowed upon any plant solely for the purpose of designating it; it is not the province of a name to describe the plant. All description is properly a part of the text. This description should present a characterization of the variety, rather than a mere list of adjectives intended to catch the eye. The committee desire to suggest that a variety never be described under a name which is accepted as a synonym; if the synonym is used as a leader, it should stand only for the purpose of making a reference to the proper name; as, *Ivory Ball*—See *White Apple*.

L. H. BAILEY,
E. S. GOFF,
W. J. GREEN."

RULES.

"1. The name of a variety should consist of a single word, or at most, of two words. A phrase, descriptive or otherwise, is never allowable; as, *Pride of Italy*, *King of Mammoths*, *Earliest of All*.

"2. The name should not be superlative or bombastic. In particular all such epithets as *New*, *Large*, *Giant*, *Fine*, *Selected*, *Improved*, and the like should be omitted. If the grower or dealer has a superior stock of a variety, the fact should be stated in the description immediately after the name, rather than as a part of the name itself; as, '*Trophy*, selected stock.'

"3. If a grower or dealer has procured a new select strain of a well known variety it shall be legitimate for him to use his own name in connection with the established name of the variety; as, *Smith's Winningstadt*, *Jones' Cardinal*.

"4. When personal names are given to varieties, titles should be omitted; as, *Major*, *General*, *Queen*.

"5. The term *hybrid** should not be used, except in those rare instances in which the variety is known to be of hybrid origin.

"6. The originator has the prior right to name the variety; but the oldest name which conforms to these rules should be adopted.

"7. This committee reserve the right, in their own publications, to revise objectionable names in conformity with these rules."

These rules sum up the whole question, and I need not comment further in this direction as the advantages as recommended are evident to all.

As to the subject of fungus and insect enemies, we have an instance of the value of science. You have all seen and know what pear blight is. Its cause and prevention have been a good deal of a puzzle to horticulturists. It has been proven to be caused by a species of microbe that can be transferred from one tree to another. The subject of insecticides has also had considerable attention. Prof. Cook, of Michigan Experiment Station, has done considerable in this direction. Fertilizers

* A *hybrid* is the product of true species. There are few, if any, instances of true hybrids among common garden vegetables. The union of varieties gives rise to a *cross*.

are receiving some attention. Some years ago the Massachusetts Horticultural Society made some experiments with potash on grapes. Delaware is at present experimenting with fertilizers for garden vegetables, and New Jersey with fertilizers for apple orchards and for tomatoes. As to our own experiment station, you have with you our horticulturist, Mr. Butz, who will be able to explain our work more in detail. While we feel that agriculture is the leading feature, we will give horticulture a liberal share of attention also. We expect to investigate insecticides and fungicides and will be glad to hear from any one interested. Any one sending his address to the station will receive reports as issued. I am glad to have met and had an opportunity to talk to you and I thank you for your kindness and attention.*

Mr. McWILLIAMS. I would like to inquire as to the results of recent tests with corn without nitrogen.

Prof. ARMSBY. No nitrogen, no growth. The object was to see if corn could get nitrogen from the air. Clover can get it from the air, but on the other hand cereals do not have that power. A single experiment failed to show conclusive results and was not entirely satisfactory.

OUR HOME BIRDS

Was the subject of a very interesting talk by Dr. B. H. Warren, of West Chester. He spoke substantially as follows:

Mr. President, Ladies and Gentlemen: It is not my purpose this evening in talking to you of birds of our state, to use their Latin or scientific names. Such terms would be mystifying to many of you, and I will use the common English names, and some of a local character. There are over three hundred kinds of birds in Pennsylvania, though a number of them are of little interest to horticulturists or farmers. Of this class are geese, ducks, sandpipers, etc., that live chiefly along water courses, and are but little known to the farming community. I will endeavor in a brief way to talk of such birds as are best known to you. First are the sparrows, finches and buntings, which belong to the same family, and of which there are some thirty species. Sparrows all have heavy cone-shaped bills, and all feed chiefly on a seed or grain diet.

The Red Corncracker, which is frequently seen in the southern counties of our state and in the southern states, owes its name to the fact that it can crush corn easily. It has a tough muscular gizzard, while owls and hawks which live on a carnivorous diet have flabby gizzards. Some sparrows feed on buds, others on insects. Their food varies. We have some that are resident, *i. e.*, that stay here the whole year. Others only breed here, and others go farther northward into the Arctic regions. Others, again, go south, and there are still others that are only here in the winter. Some are stragglers, and only happen among us by accident as it were. There are two instances where warblers belonging to the Pacific coast have been found in this state.

Of all birds in this commonwealth, the English Sparrow is perhaps the most destructive and injurious. It should be called the European House Sparrow. It is at home all over Europe, but was imported from England to this country and hence takes the name of English Sparrow.

*The foregoing address of Prof. Armsby, as well as those of Dr. Warren and Prof. Meehan which follow; were delivered orally and without notes, and not being stenographically reported, are necessarily very brief, disconnected and imperfect —
THE SECRETARY.

It is in some localities very destructive, and ornithologists of the whole civilized world have conducted systematic investigations as to its life and habits. The Department of Agriculture at Washington, D. C., has received reports from about thirty-three hundred observers in all parts of the United States; of these ninety-eight per cent. condemn the sparrow because he destroys great quantities of wheat and corn, and also devour the eggs and young of other birds, and drives them from the habitations of man. In this state about twenty species are driven away by English Sparrows, all of which are beneficial. They also devour or destroy the buds of pear, peach, plum and shade trees, as well as garden products, beans, peas, lettuce, etc. There are other species of sparrows that are more or less injurious, but in a smaller degree.

The Purple Finch is seldom seen as a resident here. In summer it is found in the mountain regions. They devour buds of fruit trees to some extent. The Pine Grosbeak frequents in winter, pine forests of the mountainous regions and is not found in this state during the summer.

We have in Pennsylvania ten species of woodpeckers. Some are better known as sap-suckers, the general belief is that they devour the sap of trees and this leads to their destruction. There is only one species that subsists on the sap of trees, and that is the yellow-bellied woodpecker (*Sphyrapicus varius*). If you will examine the tongue of any species of woodpecker, other than the yellow-bellied, you will find that they are barbed at the extremity. The bird can thrust forward its tongue and pull out from holes and crevices of bark, ants and other insects with great ease and rapidity.

Another well known bird is the American Cuckoo or Rainbird. This bird builds a nest of small twigs and cares for its young. The European Cuckoo does not build a nest, but lays its eggs in the nests of other birds.

The Cow Blackbird, or Cow Bunting also deposits its eggs in the nests of other birds, and makes no attempt to provide for its young.

Fruit growers are often annoyed by small birds in flocks, which destroy their early cherries. They are Cedarbirds, which, though very destructive to early cherries, are not without their good traits.

Swallows are among the most useful and beneficial birds for the farmer and fruit grower, as they subsist almost solely upon different kinds of insects.

As to the "Scalp act" I would state that I am not opposed to it if proper discrimination is made between birds and mammals that are injurious to farmers and those that are not. I find that some seventy or eighty thousand dollars have been paid for the destruction of hawk and owls in Pennsylvania, under the Scalp Act of June 23, 1885. I have investigated the food of the Raptores, and found that about ninety-five per cent. consisted of insects and beetles. It is right that a bounty should be paid for wolves and bears, if we had any, also for wildcats. And for foxes and weasels. There is also desire in some sections that a bounty be paid for English Sparrows, but I would oppose the passage of such an act until we are better able to distinguish the sparrow from similar birds that are solely insectivorous and beneficial. I am informed that in one county of this state, nearly two thousand dollars was paid for a mules' hide and a buffalo robe, under one of our recent bounty acts.

A MEMBER. What birds, if any, will eat the Colorado beetle?

DR. WARREN. There are three birds that will eat this insect. The

Rose-breasted Grosbeak is one. In Crawford and portions of Erie counties it is a summer resident, and one gentleman informed me that it had kept his potatoes clear of Colorado beetles. The Cuckoo and Ground Robin will also eat them. In one instance I have known the Whip-poor-will to do so. If any further questions I will endeavor to answer them if I can. I thank you for your kind attention.

Mr. McWILLIAMS. What weasel do you refer to as being destructive?

Dr. WARREN. The large weasel subsists mainly on birds and poultry, and my investigations show that it should be destroyed.

After a short recess business was resumed, and Prof. Meehan made a brief address, taking as his subject,

LITTLE THINGS.

Although my name is not on the programme, it has been announced that I would address you. I will not be able to remain with you after this evening's session, and will therefore make a few general remarks before adjournment.

We usually tell our children to do the best they can, and in addressing you this evening, without preparation and without any specially assigned or prepared topic, I will try to do some good by doing the best I can.

You no doubt remember the story of a fashionable club, one of the peculiarities of which was that everything should be done by dumb show. A gentleman who was proposed for membership was handed a glass of water to indicate that the club was full and there was no room for another, thereupon the applicant placed a rose petal on the surface of the water, indicating dumbly in his turn there was at all times room for at least a floating thought, and was elected, and this may be my case to-night.

Seeing a number of children here this evening, I thought some reference to "Little Things" might interest them, and be a useful lesson to us all. It has been stated by some writer that a certain scientific man spent his lifetime investigating the gizzard of a cricket with useful results. All our great inventions were the outcome of little things, and often the tests and experiments that proved to be of little benefit to the inventor and discoverer or any one at that time, have proved to be an incalculable blessing to many others. Who ever thought that the pressure of steam upon the lid of a tea-kettle which millions had seen, would lead to the invention of the locomotive. Even these children do not now see or know the use of things they are taught at school. It is only when they grow older and wiser, that they can put into practice what they have learned. This brings me to botany which is more closely related to horticulture. It is said that Columbus, while walking the shores of Spain, took up a piece of wood found floating on the water, and which he took to a botanist, who found it a species that did not grow either in Spain or Portugal. They studied the drift of ocean currents. They saw that the wood must come from an unknown land, and their conclusions led to the discovery of America. Thus you will see how simple was that botanical fact, and what great results it has brought about. Though we do not at all times know the use of facts, we collect them and must wait and see.

Take the question of roadmaking for instance. It perhaps does not occur to us that not frost but water is the great enemy of good roads. Knowing this, it would seem an easy matter to drain and thus secure

good roads. But people do not note this little thing, and we do not get good roads. It is a most interesting study of nature to notice the uses that plants make of water, and how they can draw it from the soil. It may seem so dry that no moisture is apparent, and could not be obtained by a hydraulic press, and still some will be drawn from it by plants. Plants and vegetables maintain their life by the circulation of water through their vines and stems. On this little thing depend great agricultural operations. So in bulbs there is not only internal heat, but internal life, that will come forth as soon as frost disappears in spring; and here again is a little fact of great horticultural importance. Nothing is more mysterious than some of laws which govern vegetable life and growth, all dependent on every day facts and more interesting than the study of the stars.

Here on the table is a Lily of the Nile (*Calla Lily*). It was discovered only a few years ago that these flowers before expansion contain a large degree of heat, sometimes as much as five degrees more than the surrounding atmosphere, and it has been shown that some palms are ten degrees higher in temperature. It has been found by study that heat is necessary to cause expansion of flowers and that most flowers open by the power of accumulated heat. In some instances the expansion is almost instantaneous.

In regard to light, we are taught every day that it is essential to the growth of all plants, and it has been supposed that they grow upward on account of light. While the potato in the darkest cellar will grow toward the light, the begonia will retain its dark green color in the darkest room, proving that there is something else than light that is essential to its life and growth. Some little thing will some day explain the mystery. I could give numerous other illustrations, but time reminds me that I must close.

I might say in conclusion that I would rather see a man study the gizzard of a cricket all his life than live as some people do, go through the world without seeing anything, and the reason why so many see nothing is because their eyes are open to see only that which is great and wonderful; ignorant that all great deeds spring out of and are the accumulation of little things.

The wonderfully constructed human mind which can go through the world seeing and learning so little, always reminds me of a locomotive without steam.

On motion a vote of thanks was tendered to Dr. Warren and Profs. Armsby and Meehan.

Messrs E. W. Thomas, Rupp, Lantz, Woods and Herr were appointed a committee on nomenclature to examine and report upon the fruits, etc. on the tables.

The president reminded the members of the association, that Prof. Butz, the horticulturist at the experiment station at State College, would be with us to-morrow and give a lecture on the "Fungus Diseases of Fruits."

On motion of Mr. Davis the president was authorized to appoint a committee of five to represent this association at the annual meeting of the State Board.

Adjourned.

THURSDAY MORNING.

Being called to order by the President, Rev. J. W. White, of Milroy, Pa., after a few preliminary remarks, read the following paper on

HORTICULTURE AND BEE-KEEPING.

Mr. President and Gentlemen of the State Horticultural Association of Pennsylvania :

Horticulture and bee-keeping are kindred industries. By the one, we furnish the flowers from which the honey is gathered; and by the other, the agents to fertilize the flowers and so far assure an abundant fruit harvest. The secretion of honey by flowers seems to be a provision of nature to attract the bees and by their labors secure a perfect fertilization; while the province of the bee is to perform a double service, to assist in the production of fruit and gather surplus stores of honey, and thus furnish mankind with fruit and honey, two of our greatest luxuries and most wholesome articles of food. Horticulture was man's original avocation. Honey gave him his first experience or taste of perfect sweetness and in a form which does not clog the appetite. Tens of thousands of tons of honey go to waste in our own state every year because there are not bees enough to gather it. Fruit and honey may and should be produced in such abundance as to supply the wants of every member of the human family. There is not now, nor is there likely to be, an over-production of either of these articles; but there is doubtless a very great under-consumption. The great mass of people use very little fruit, many more seldom, if ever, taste honey. But the world is progressing. Men are rapidly advancing in charity, intelligence and material comfort. We are now passing through, or, at least, approaching the final stages of the evolution of a perfect society or fellowship among men which is destined to bring them into the possession and enjoyment of all the riches of their common inheritance. "For the earth is the Lord's and the fullness thereof" and "The earth he hath given to the children of men." In this onward march of human affairs, horticulture and bee-keeping should keep pace with all other industries relating to the wealth, the comfort and the advancement of mankind.

Horticulture and bee-keeping may each be carried on as a specialty in a larger, or smaller way, giving employment to one man or many men according to the extent of the business. Or they may both be united under the same management as is often done at the present time and made to supplement each other in their demands for labor and in their remunerative returns. Some men have made and are making fortunes, in either business or in both combined. Many others are making a comfortable living for themselves and their families in the same way. In addition to this, almost every man who has a garden or a small lot of ground, especially mechanics and professional men, may find needful out-door exercise and pleasurable recreation in giving some intelligent attention to horticulture and bee-keeping; and they may thus also increase considerably the sum of their annual income. To those who feel burdened in the effort to eke out a meagre support for their families, these industries stand with hospitable doors ever open, thus inviting them to enter with joy and be filled. Those who in other business

are able to make a mere competency, may by this means add a few hundred dollars more or less, annually, to their income and may thus lay away something for a time of need, secure better educational advantages for their children and in many ways find that a little extra pocket money is a thing not to be despised. It is possible that some prigs of professional men may be disposed to jeer at others for engaging in such homely pursuits and for coming down, or up, which? to make a little money in this honest productive way; but these workers can well afford to leave them to all the entertainment they can thus get, while they go on their way, enjoying all the more their recreations and labors, just because they are honest and productive.

But is there no element of danger or risk of failure in these pursuits? Do all horticulturists and bee-keepers find the business a pleasure and a profit? That all depends on what you mean by horticulture and bee-keeping. If horticulture consists in purchasing an indiscriminate list of plants and trees, such as almost any travelling salesman is competent to recommend, and at the fancy prices he asks for them, in setting them out with more or less care in any kind of soil which may happen to be convenient, in then leaving them to fight their own battles against great odds of all kinds of cumberers of the ground, and, finally, in allowing them no care or pruning except the browsing the cattle may gratuitously give them, or an occasional attack by some man with saw and axe who cuts and slashes away indiscriminately at their innocent unconscious sufferers; if this is horticulture, then it is almost certain to prove a failure, without affording either pleasure or profit, but only covering with shame the man who engages in this business.

If bee-keeping consists in purchasing a number of colonies and patent hives, and setting them in a yard, in looking at them now and then but giving them no care, except the rattling of pans, the ringing of bells, the sawing off of limbs from valuable trees in the swarming season, and then, in coming around in October to brimstone the bees or to steal from them their winter stores; then, bee-keeping, also, will prove a vexation and a failure.

But we insist that this is not horticulture, this is not bee-keeping. There are sciences and arts and every man, before engaging in them, should make himself familiar with the science; and as soon possible, by thoughtful care and practice, make himself master of the art. To do this successfully, three things are required. To succeed, every man must, first of all, bring to his business energy and industry. He must shake himself free from his constitutional tiredness. We must stick to the old proverb in its literal form and never put off till to-morrow what can be done to-day, he must never invert it as many do, and thus, never do to-day what they can put off till to-morrow. In nothing, are delays more dangerous than in horticulture and bee-keeping.

In order to keep on putting energy and industry into his business, he must in the next put his heart into it. He must learn to love the living things with which he works. That is, he must feel a living interest in them. Their presence, their nature, their development, their expanding beauty and fruitfulness, must be to him a constant delight. Then his labors will be labors of love. Then the rewards of his toil—some industry will not all be postponed and confined to the handling the money he finally obtains. But his delight, from day to day, in his garden, his orchard, or his bees, will often be greater than he will find in consuming the luscious products of his toil. There is nothing like love, interest, delight to keep a man at work.

Another indispensable requisite to success is intelligence. One great reason why many men do not feel more interest in their living servants is, they know so little about them. The better they understand their habits, their wants and the means of their development, the more they will feel like giving them the nurture they need. Even those who feel the deepest interest and are most diligent at their work, will certainly fail in bee-keeping and generally in horticulture, if they do not thoroughly understand their business. Ignorance has had its day and is done for. There is a premium now, and an ever-increasing one, on intelligence in industry. And happily, the means of acquiring this are now in the reach of every man. Books, periodicals, neighborly conferences, and meetings of associations, one or all, are now available. With intelligence, skill and industry, there is no doubt but that horticulture and bee-keeping, one or both, can be made a success.

Time forbids me going into any details in this paper, or in attempting to enumerate the one thousand and one particulars on either business which it is important to understand and practice. This lack may be part supplied by the conferences of this association.

Mr. BARTRAM. What hive and books would Mr. White recommend?

Mr. WHITE. There are a number of good hives offered by different manufacturers. Langstroth's is good. Another hive called "Simplicity" is also good and is somewhat cheaper than the first named. It is the "Langstroth" hive simplified. Any good hive will be satisfactory, but I would advise bee-keepers to adopt a certain style of hive and confine themselves to that only.

As to books, Langstroth's work is the pioneer. Quinby's work is also standard, as is also the work by Prof. Cook, of Michigan University. The *America Bee Journal*, published in Chicago, and *Gleanings in Bee Culture*, published in Medina, Ohio, are excellent periodicals of their kind.

Mr. BARTRAM. What amount of honey in a season would you consider an average yield per hive?

Mr. WHITE. About twenty pounds. A good dry cellar is about the best place for wintering bees. The temperature should be kept at about forty-four degrees or a little lower. During a winter like this, bees will do just as well out of doors.

Mr. McWILLIAMS. Was honey darker than usual this year?

Mr. WHITE. No, sir; there was about the usual quantity of white clover and linden. Each has its own color and taste. Several times my bees have gathered large quantities of very dark honey, which granulated in the comb and could not be extracted. I merely set it away in the combs and did not offer it for sale. It should have been extracted before it granulated. It was likely gathered from red clover. Honey gathered from white clover or linden or apple blossoms would not have granulated. Honey from raspberries has a very peculiar and delightful flavor.

Mr. THOMAS. I was always under the impression that bees could not get honey from red clover.

Mr. WHITE. They can work on the big red clover in June.

Mr. ENGLE. Will pure honey granulate in the comb?

Mr. WHITE. Honey from red clover will granulate and all honey will granulate when exposed for a while to the air. The only way to prevent is to heat to about one hundred and twenty to one hundred and thirty degrees and put up in air-tight jars. I have kept it in this way

for years. Honey should never be heated to the boiling point as it changes it in character.

Mr. THOMAS. Do you allow bees to make their own comb?

Mr. WHITE. I would use comb foundation so as to have them build their combs straight.

The secretary presented a biographical sketch of Dr. S. S. Rathvon of Lancaster, by Dr. Goding, of Illinois, and was authorized to publish the same with annual report. The sketch, with portrait of our honored entomologist and one of our oldest members appears elsewhere in these proceedings.

The president read the list of essays and queries on the programme, and asked the wish of the society in reference thereto.

On motion of Mr. Rupp the selection of a place for the annual meeting was next considered.

Mr. ENGLE. I propose Lancaster, and suggest that we have at our next meeting, as far as possible, a reunion of all the original members of this society that were present at its organization in that city some thirty years ago. It occurred to me on my way here yesterday and I mentioned the matter to Prof. Meehan who heartily approved it. When we first met and organized in the parlor of Cooper's Hotel in Lancaster, we were the 'Eastern Pennsylvania Fruit Growers' Society.' Some years after we changed to "Pennsylvania Fruit Growers' Society," and later still we assumed our present and more comprehensive title. Our first meetings were confined to a few counties in the eastern section of the state. In about thirty years from a small membership and a limited scope of territory, we now embrace the entire state, and we hope in a few years to hold our meetings westward as far as Altoona and Pittsburgh. I hope also that we will soon be able to hold two meetings annually, one business meeting in the winter, and one for exhibitions in the summer or fruit season. I think the older members in looking back, may congratulate themselves on the steady growth and success of our association.

Mr. FOX. I intended naming Reading for our next annual meeting, as we always have a good attendance at that place. However, as Mr. Engle has suggested that we meet and have a reunion at Lancaster, I cannot do better than to second his motion.

Mr. Woods named Harrisburg.

The PRESIDENT. There are strong reasons why we should go to Lancaster. Many of the old and original members are in that vicinity, and would, if possible meet with us.

Mr. McWILLIAMS. I think I can realize to some extent how the older members would enjoy a reunion. Some years ago I belonged to a literary society which disbanded and separated. A quarter of century passed and on January 8, 1889, we had a reunion, which was the source of much pleasure and satisfaction to us all. I can appreciate to a great extent how the older members of this horticultural society will enjoy a similar occasion. I most heartily favor Lancaster, and hope you will decide to meet there next January.

Mr. Woods withdrew Harrisburg, and on motion of Mr. Rupp the selection of Lancaster was made unanimous.

Mr. Jamison, chairman of committee on nominations, submitted the following report.

To the State Horticultural Association of Pennsylvania: The undersigned committee on nominations would respectfully report that at a meeting held this day it was unanimously agreed to recommend the

reelection of the old officers for the ensuing year, with the appointment of Dr. B. H. Warren of West Chester, as professor of ornithology.

Respectfully submitted.

J. E. JAMISON,
CYRUS T. FOX,
WM. M. PANNEBAKER,
A. H. YEAGER,
E. C. BRINSER,

Committee.

Report having been received and the secretary authorized to cast the ballot of the association, the following were declared duly elected officers for 1890.

President, H. C. Snavely, Lebanon, Pa.

Vice Presidents, Josiah Hoopes, West Chester; H. M. Engle, Marietta;
W. M. Pannebaker, Lewistown.

Recording Secretary, E. B. Engle, Waynesboro'.

Corresponding Secretary, W. P. Brinton, Christiana.

Treasurer, J. Hibberd Bartrim, Milltown.

Librarian, Thos. J. Edge, Harrisburg.

Mr. WHITE. While discussing the place of our next annual meeting, it occurred to me that it would be well to encourage the forming of auxiliary societies in every county of the state.

Mr. ENGLE. I heartily endorse the suggestion of Mr. White. Nothing would aid our horticultural work so much as the formation of such organizations. In Michigan they have auxiliary societies in many counties, and they have aided in building up one of the leading state organizations in the country. I trust that Juniata county will take the lead in this movement.

Mr. WHITE. Probably if this society would prepare and send out a form of constitution and by-laws and instructions for organizing such societies, it would greatly aid the good work.

Prof. HEIGES. I think if Mr. Fox, our chairman of General Fruit Committee, would send out copies of our constitution and by-laws, and encourage the formation of auxiliary societies, we would next year have ten counties represented. I will obligate myself to reorganize a horticultural society in York county. In this way we can achieve practical results. If we want any legislation it can best be secured by local organizations in the several counties. That is the way they have done in Michigan and they have almost entirely stamped out the yellows in that state. They have a law making it a penal offense to neglect to promptly remove trees affected with yellows.

Mr. FOX. This is an interesting question and a very important one. We have such an organization in Berks county and it is one of the few live societies in the state. Several years ago we offered four hundred dollars in premiums for the encouragement of horticulture.

I hope we may be able to organize a number of auxiliary societies. They would aid us greatly in our work. Several such organizations in the northern and western counties would open the way for holding annual meetings there and largely increasing our membership. We have already had invitations to meet at Pittsburgh, Meadville, Warren, Huntingdon and other points.

Our meeting in this place has brought us a number of new members. I heartily endorse all that has been said about the movement to organize auxiliary societies and hope the effort will meet with success.

On motion of Mr. White, Mr. Fox was authorized to prepare a form of organization for county societies and send them to every county in the state.

Prof. HEIGES. I am glad to know that after thirty years this society has gotten a chairman of General Fruit Committee who has succeeded in getting reports from every county :

The following was offered by Mr. McWilliams.

Resolved, That this horticultural society now in session, appoint a committee to draft a bill and present the same to our next legislature, which will convene in the city of Harrisburg in January, 1891, for the enactment of a law for the prevention of or stamping out the disease known as yellows in peach trees in this commonwealth.

Mr. JAMISON. There is a similar resolution now on our minutes. I am anxious that we take some action in the matter.

Mr. ENGLE. I think we had best postpone action on this resolution until the arrival of Col. McFarland who is chairman of committee formerly appointed.

A motion to that effect was made and adopted.

Mr. WHITE. Much good could be done in this direction if every member would speak or write to their representative in the legislature, and do what they could in that way.

The following essay was read :

EXPERIENCE WITH HEDGE FENCES.

By H. M. ENGLE.

The fence question has become one of more than ordinary interest to land owners generally, in consequence of the smaller profits from the products of the soil and greater expense of wooden fences than when timber was more abundant and cheaper. Hedge fencing has been resorted to for quite a good while, sufficiently long to have, by this time, fully established its merits. Such, however, is not the case, since it has had its boom up and down ever since its first introduction. I refer especially to osage hedging since it is the kind generally planted.

I have had no experience with other thorn-hedges, and in fact they are few and far between compared with osage.

Honey Locust, Silver Thorn, and Pyracanthus, the latter an ever-green thorn plant, have all been planted as hedges, but have never become popular, except possibly the Honey Locust in some sections.

My experience with osage within thirty to forty year has been both favorable and unfavorable. When properly attended to it is quite satisfactory, but when neglected it is simply a nuisance. In order to establish a good hedge, the following requisites are indispensable; first, the preparation of the ground as we would for corn or potatoes; second, procure good plants one year old and grade them, to as near uniform size as possible, so as not to place a feeble plant between two strong ones, top off to two or three inches of green wood; third, draw a furrow deep enough to put the plants down so that when planted and the ground leveled the yellow portion, or root is covered; fourth, cultivate a few seasons, the first especially as we should any summer crop and keep as clean of weeds. At one year old cut it down to about six inches, and at two years to about a foot according to vigor of growth. The second season a little summer pruning of side branches will be in order, and third season it should be pruned twice and gotten into proper shape so to keep it narrow and tapering to the top which should be

cut down to about three feet at the end of third season, when it should be in condition to turn ordinary stock.

Henceforth it should have two to three summer prunings so as to keep it within proper bounds. We have found no better implement for this purpose than a good scythe.

With this manner of pruning it will naturally enlarge a little every season which will require once in several years a cutting in with a hedge shears, which should be done when dormant.

By following this method of treatment and keeping clean of weeds and rubbish to prevent mice from barking the stems, an osage hedge may be kept in good condition for an indefinite period.

On the other hand when carelessly started, and proper pruning neglected until beyond reach, it will not deserve the name of hedge fence. As a middle fence I would prefer some other fence as a hedge cannot be moved, but as an outside fence it is never out of place when properly managed, and along streams and where subject to floods it's *the* fence.

We have hedge that was flooded frequently, sometimes washed down flat, but set up again it would soon outgrow the rough treatment, and seems to this day none the worse for it. As an ornamental hedge, or where not required to turn stock, evergreen is preferable, since it is much easier kept in good condition than osage.

American arborvitæ is most generally planted, but I know of no evergreen that will make a more beautiful hedge than hemlock and also hardy as any. One objection to hedging is that it requires a temporary fence until strong enough to turn stock. The best osage hedge that I have yet seen is made by root pruning and leaning the stocks when at a proper height to about forty-five degrees and several wires run through. By this method of training it can be kept more easily under control. Before seeing this I could not have believed that a hedge could be trained so narrow, and yet so close that fowls, or even rabbits could not easily get through. I do not see how a more complete osage hedge can be made. There are parties who offer to plant, train, and keep in good condition for any reasonable period on very reasonable terms. The method however is patented, which in itself is no serious objection, but several parties are in the field, each claiming preëminence and are at loggerheads, which causes many to hold off until it is decided who are the proper claimants.

I would not grow another osage hedge except by the method described. The tendency however is toward no fences, or at least much less of it on account of the heavy expenses, which add largely to curtailing the meager profits of soil products.

Mr. BRINTON. One variety of evergreen the essayist did not mention. The Siberian arborvitæ. It is one of the best and finest.

Prof. BUTZ. Evergreen hedges are excellent for wind breaks and screens, but will not turn cattle. Not long since I heard osage orange objected to, because they root freely and when torn or broken by the plow throw up plants. This objection was answered by suggesting a trench and turning all roots lengthwise, stating that they would continue to grow in that direction.

Mr. ENGLE. By the new method of growing hedges the roots are not large and make no trouble.

The PRESIDENT. I would like your opinion as to the best material for a hedge about a house with about an acre of ground. What would be best in connection with wire? How would Japan quinces do?

Mr. THOMAS. Either of the evergreens named will answer in con-

nection with wire. If deciduous hedge is desired Japan quince or California Privet will answer.

Mr. WHITE. The prettiest evergreen hedge I ever saw is common hemlock.

Mr. ENGLE. Nothing I have ever seen is equal to hemlock. It does not brown or change color but remains a beautiful dark green all winter.

Mr. BRINTON. Were I planting a hedge for beauty, would plant American or Siberian arborvitæ. Hemlock is subject to attacks of red spider or a similar insect and is not as hardy as the arborvitæ. Siberian arborvitæ is not a native of Siberia, but simply a seedling of American of more dense habit of growth.

Mr. BRINSER. I have been informed that hedges will interfere with crops growing near them. Is such the fact? Mr. Engle lives in Lancaster county where they have good soil. Will a hedge succeed in poor soil?

Mr. ENGLE. Not unless fertilized.

Mr. THOMAS. Is it best to cut the hedge back after one or two years planted?

Mr. BARTRAM. If I plant again I will wait three years before cutting down. I have an asparagus bed twenty years old aside of an osage hedge and no roots or shoots have ever come up. Asparagus is just as good along the hedge as any where in the plantation.

Mr. ENGLE. Roots never sprout unless they are cut.

Mr. DAVIS. About thirty years ago a number of hedges were planted in the Juniata valley but I have never known any to spread from the roots.

Mr. ROTHROCK. Has any one had experience with willow for hedging? Quite a number were planted in our county some years ago. They made plenty of willows but no fences.

Mr. WHITE. My own conviction is that some evergreen hedges about buildings are always desirable, but for other purposes a number of panels of portable fence are preferable. I look forward to the time when the farmers of Pennsylvania will go out of the fence business entirely. Millions of dollars are thus invested much of which might be saved.

Mr. Fox called attention to second annual meeting of representatives of agricultural and horticultural fairs in this State which will be held in Harrisburg on Tuesday next. I would suggest that the same delegates appointed to represent this society at annual meeting of State Board, also represent us at the aforesaid meeting.

Mr. Davis spoke briefly on

EARLY FRUIT GROWERS IN JUNIATA COUNTY.

Mr. DAVIS. I am almost ashamed to create the impression that I know a great deal about the early peach growers of Juniata county. So far as my knowledge goes the pioneer of peach growing in this county was Judge Lewis Burchfield who planted about one thousand trees on northwestern slope. It seems that he had no special knowledge of the care and attention necessary to success, and like many others in the same business, thought if the trees were once planted, they would take care of themselves. At the end of first year he had about half his trees remaining, and at the end of the second year the balance of his orchard was plowed under. The next to go into the

business were J. T. Smith & Bro., of McAlisterville, who have been eminently successful. I myself visited their first orchard and it was indeed a beautiful sight and a great success. Encouraged by their success others began planting, but it was several years before a general beginning was made. The next extensive venture was by a gentleman from Philadelphia, Mr. Bradford, who commenced in 1873. He planted fifteen thousand quince cuttings a majority of which grew. His next move was to plant peaches, apples, pears and crab apples. I am not aware that he had any previous experience in fruit growing, at least not in peach growing. He planted six thousand peach, one thousand pear and eight thousand crab apples and a number of apple trees. The quince never amounted to much. The crab apples were a success and are so yet. The pear made a fine looking orchard, but I never heard of any crop of fruit. Neither have I heard of any crop of apples.

The next extensive planters were I. C. Lantz & Co., now growing about five or six thousand peach, several thousand raspberry and blackberry and some grapes. The latter have, I believe, been a failure. There are at present about two hundred and sixty thousand peach trees growing in Juniata county, one hundred and sixty thousand of which were planted last spring, and one hundred thousand more will probably be planted next spring, and there is no telling where it will stop. Mr. Smith has the best orchard in the valley for continuous bearing. In 1888 there were received in this county for peaches some thirty to forty thousand dollars.

The varieties most generally planted are Mt. Rose, Mixon Free, Stump, Late Crawford, Smock and Salway. Some new varieties have been tried and Morris White, and Crockett's Late White promise well. Our experience is that white and yellow fleshed varieties are about equally profitable. Heath Cling have been about the most profitable. Have had no experience with Steadly.

Mr. ENGLE. Have you tried Reeve's Favorite?

Mr. SMITH. We have no Reeves in bearing.

Mr. BARTRAM. Tell us something about your method of trimming.

Mr. JAMISON. We cut back to get symmetrical and compact growth, and to keep branches and fruit within reach; also to prevent trees from overbearing.

Mr. KNOUSE. We practice many things because we know they bring successful results, though we do not always know why. I would like to know the theory of pruning. Is it to concentrate the vitality, as well as to improve the shape and symmetry of the tree?

Mr. WELLINGTON SMITH. The strength a tree takes out of the soil is mostly taken in maturing the kernel or seed. In a crop of apples if we prevent excessive bearing, we will save much of the vitality of the tree. If this is the correct theory, judicious pruning and severe thinning of fruit will preserve the vitality of our orchards.

Mr. BRINTON. The theory is entirely correct. The vitality of any plant or fruit is expended more in the production of seed than in any thing else. Almost any plant, if allowed to seed excessively, will become exhausted.

Mr. ENGLE. One word in reference to peach growing in this county. As Mr. Smith has not come forward to speak for himself, I will refer to him. Mr. Smith bought his first trees from us, and so far as we knew we told him how to plant and care for them. After starting his orchard he invited me to come and see it, and I was greatly pleased with its thrifty appearance and his prospects of success. I fully agree



20 YEAR OLD PLUM AFFECTED WITH BLACK KNOT.
DEC. 20. 1889.

with the theories advanced in reference to pruning. If we do not prune and cut back our trees we must pick off the surplus fruit, and it is safe to say we never pick off enough. Overbearing is one of the chief causes of the decline of trees. If we overload a horse we do not prop him up, but unload, and our trees should be treated in the same manner. I am satisfied that the method of "shortening in" practiced here is one of the principal causes of success. I feel sure that my prediction of ten years ago will be realized, and that we can grow more peaches in Pennsylvania than we can use in the State.

Another point I would urge. Do not neglect the apple. By and by we will be obliged to import apples. We have in this state soil just as well adapted to apple culture as any in New York, and we ought to plant largely and have more than enough for home consumption.

The following committee was appointed to audit the treasurer's account: Prof. S. B. Heiges, J. E. Hershey and Maurice Leonard.

Adjourned.

AFTERNOON SESSION.

Being called to order, the president announced the following delegates to annual meeting of State Board of Agriculture:

H. C. Snively, E. Davis, J. C. Hepler, H. S. Rupp, J. G. Rush, J. Hibberd Bartram.

Prof. HEIGES. Before proceeding with our regular order of business there is one matter to which I wish to call your attention. You have all read of "trusts." The "sugar" trust, the "iron" trust, the "leather" trust, the "brewers," trust, etc. Now this society is in no sense a "trust" or close corporation, and we want to increase its membership in Juniata county. Our meetings are attended with expense, and our treasury is dependent upon our membership. You cannot carry away all you hear at our meetings, but all that is said of importance is taken down and revised by our secretary, is published by the state, and supplied in book form gratuitously to our members. We would like to increase our membership here. It is in order at any time to pay your dollar to our treasurer and have your name entered on our roll of members.

Prof. Geo. C. Butz, horticulturist at the "Experiment Station," State College, Pa., read the following paper on

FUNGUS DISEASES OF FRUITS.

This subject cannot be satisfactorily treated without introducing more or less information that may be considered more scientific than practical, and yet without this scientific knowledge we labor much in vain in trying to destroy these peculiar diseases.

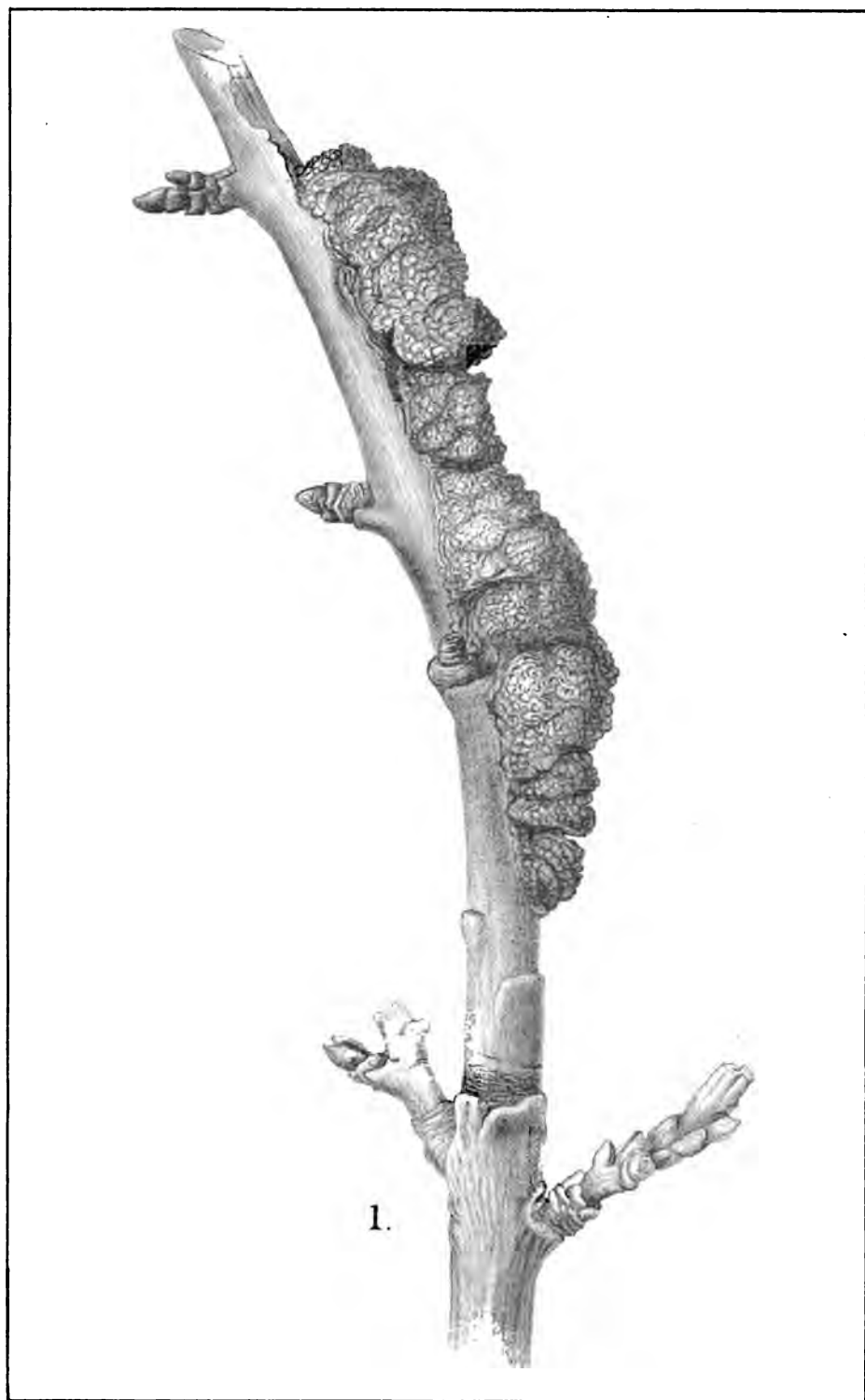
The question of how much scientific education is desirable for horticulturists is one of the live topics of to-day and its consideration cannot fail to result in good. Scientific knowledge is not alone that expensive information obtained in colleges and universities, but also that which we learn by intelligent research and observation in our respective occupations. Persons who have never attended a college and never expect to do so, should not think that science is beyond their sphere or grasp.

The college is not the source of knowledge. Scientific knowledge comes to your door daily and all that is required of you is that you recognize it and admit it. The student who spends four years of precious time at a college does not return home loaded with information as his friends expect him to be. He is not a botanist, or a chemist, or a linguist, because he had the pertinent subjects in his course of study. He has simply learned to know what science *is*; to be able to recognize it when he meets it and to admit it with due respect to his intelligence. The college is therefore but a training school to teach the youth how to study, how to observe, how to think intelligently, and how to reason between cause and effect. The mind of the youth is most receptive of truth and most susceptible to molding influences, but without proper training many years are often required to put the mind on the right road to intelligence, to reason with confidence to infer and deduce.

The importance of a little scientific knowledge was impressed upon the writer while obtaining the experience of fruit growers concerning fungus diseases. It is true that many diseases of plants have for a long time been great puzzles even to scientific students and it is only within a few years that the causes have been fixed with certainty upon those simple forms of plant-life known as *fungi*. In order that we may intelligently and successfully treat a disease we should know the nature of it, the cause of its appearance, and the conditions that favor its growth and propagation.

In the past season the writer met an intelligent farmer who had among his fruit trees several young plums which were becoming very unsightly by the infection of the *black knot*. Every branch upon which the warty excrescence occurred had been cut with a sharp knife in the spring. The depth of this cut was through the bark and extended the full length of the branch along the trunk to the base of the tree. It was also continuous and by the seasons growth was laid open. Upon enquiry the explanation given for such treatment by the farmer was that the excrescence or bursting through of the bark was due to the excessive vigor of the tree, and that by slitting the bark when the sap begins to flow, there should be great relief to the tree, and no accumulation of the warts. If the cause assumed was right, the remedy applied might be a cure, but it was not a cure, and the trees are almost beyond redemption. In the face of such lamentable treatment of fruit trees, it is hoped that a brief exposition of some recently learned facts concerning this disease may not be without interest to this association.

We find farmers and gardeners speaking of fungus diseases without knowing what a *fungus* is, or even that it is a plant. This is not surprising because of the difficulty they experience in obtaining definite information, and because of the technicality peculiar to this class of plants. Knowing, however, that it is a plant, it is impossible in many cases to see it without the aid of a compound microscope. And furthermore, while some fungi are superficial to the plant on which they are parasites, others are wholly within the tissues of the host. According to the place and manner of appearance of these curious plants, they have received various popular names—as rusts, mildews, smuts, blights, black spot, black knot, etc. These are all either fungi or bacteria and in habit are parasitic. A fungus is a plant very simple in structure. It is not green and therefore cannot derive its food from the mineral substances, but is entirely dependent upon a vegetable diet, either living or decaying. It possesses no leaves, roots or stem as ordinary plants, but with a few exceptions the entire vegetative portion of the



Black Knot (*Sphæria Morbosa*) on the cultivated plum, as seen in Autumn.

plant consists of slender simple or branching threads which form a network over a surface, or ramify decaying or living tissue piercing the walls of cells in search of juices. This network of white threads forms the *mycelium* of the fungus.

Without entering in detail upon the variations of the mycelium, it is the purpose of this paper to adduce only so many facts as are necessary to a fair conception of a fungus. An essential part of every plant is the power of reproduction and in all ordinary plants this power resides in the flower which produces seed. A fungus is a flowerless plant, and instead of seeds it bears *spores*, exceedingly minute, yet having the ability under favorable circumstances to develop into plants similar to those which produced them. These spores are produced in a variety of ways—some quite simple, others very complex—and therefore it is quite difficult to follow the cycle of life from the spore to the production of spore of many fungi. Suffice it to say that spores are produced and in exceedingly great numbers, that float freely and invisibly in the atmosphere. In this way a single case of a fungus disease may rapidly spread over a large territory. The harm done by a certain fungus is generally confined to a single host plant; but may extend to some closely related ones, as in the case of the *black knot* of plums, the same fungus attacking certain wild and cultivated cherries.

It is to this fungus of the black knot that your attention is more especially invited. The disease is peculiar to America and is fortunately confined to the plum and a few cherries. Its presence is easily recognized by the thick black swellings on the branches, so prominent after the leaves have fallen. The wart-like excrescence does not entirely encircle the branch, but may extend several inches along the side of it, and perhaps cause it to bend from its direct course.

The accompanying photograph of a plum tree—greatly disfigured by the black knot—was taken from an old tree just previous to its destruction. Though not much larger than a six year old tree, it has lived and suffered for nearly twenty years without yielding anything but contagion.

This warty growth (see Fig. 1) is caused by a fungus (*Sphaeria morbosae*) developing within the growing tissues that exist in the tree between the wood and bark.

A spore lodging on the surface of the bark germinates and sends a filamentous growth into the cambium tissue where the nourishing sap is found. Here the peculiar plant grows rapidly and bundles of minute threads develop and constitute the *mycelium* of the fungus (see Fig. 2). In the spring the diseased portion of the branch increases in size by the growing of the mycelium which soon reaches and bursts through the outer bark, and in June the knot has reached its full size though still greenish in color. At this time the whole surface of the knot will show under an ordinary lens, small hemispherical protuberances which indicate the *perithecia*, or the places where winter spores will be produced. The entire surface is covered with very minute filaments called *conidia* which produce on their terminal joints one or more spores called *conidial spores* (see Fig. 3). These conidia continue to bear spores until the latter part of summer, when they begin to dry up and the knot assumes its black color.

Turning now to the *perithecia* we find they are small sacs scattered through the interior of the knotty substance and bear on their inner surfaces long cells called *asci* or *ascocarps*, each of which contains about eight ascospores, or sexual spores (see Fig. 5 and 6). The asci grow

slowly during the fall and winter; they begin to ripen their spores in the latter part of January and continue to do so until spring. Besides the summer spores and winter spores there are yet other forms called stylospores which are produced in cavities between the perithecia (see Figs. 7 and 8).

We learn from this that the opportunities for the propagation of this fungus are very numerous, but we learn also many facts that will aid us in determining how to prevent such rapid reproduction.

The simplest remedy for this remarkable disease is to cut off all knots and swollen parts of the branches, sacrificing the branch if necessary at any time of the year. The knots are most readily seen just after the leaves have fallen, and then all branches bearing the knots should be cut away and burned. Immediate burning is necessary, as it is known that the fungus continues to grow in the several branches ripening the winter spores. Wherever the disease exists, it is highly important that every trace be destroyed in order to succeed in its extermination. Urge upon your neighbors the importance of their coöperation. Examine all the chokecherry trees in your vicinity and destroy its similarly diseased wood, as it is affected by the same fungus.

Explanation of Figures.

1. Black Knot, (*Sphaeria Morbosa*) on the cultivated plum as seen in autumn.
2. Section of chokecherry stem, showing the mycelium before it has reached the surface.
3. Section of choke cherry in May showing the Conidia on the surface bearing spores.
4. Conidia greatly enlarged.
5. Cross section of a Perithecium bearing asci in the center.
6. Asci enlarged showing eight ascospores in each.
7. Section through a cavity containing stylospores.
8. Stylospores greatly enlarged.

HORTICULTURAL FERTILIZERS.

Mr. Hiller being absent the following paper was read by the secretary:

Fellow Members of the State Horticultural Association of Pennsylvania:

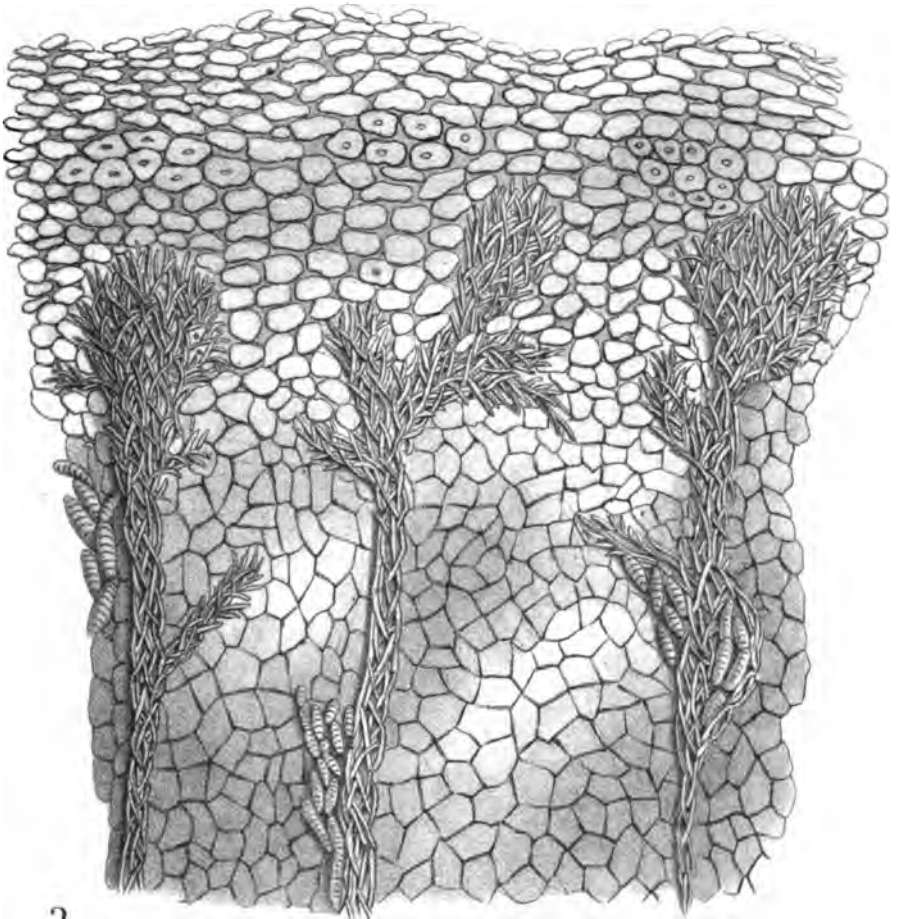
Your worthy secretary desired me to give my views on "The best and cheapest horticultural fertilizer."

The most important elements of manure consist of nitrogen, phosphoric acid and potash, and these elements must be lying or flying around our fields before we can expect to raise good crops of grain or fruit.

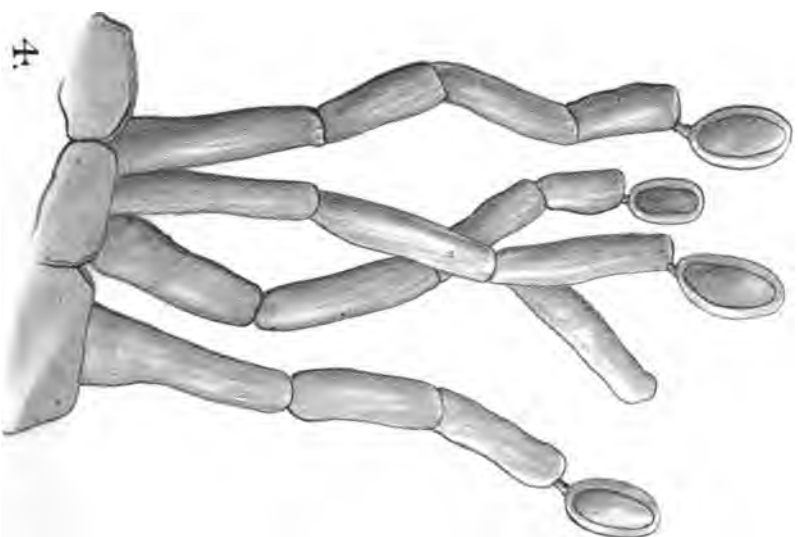
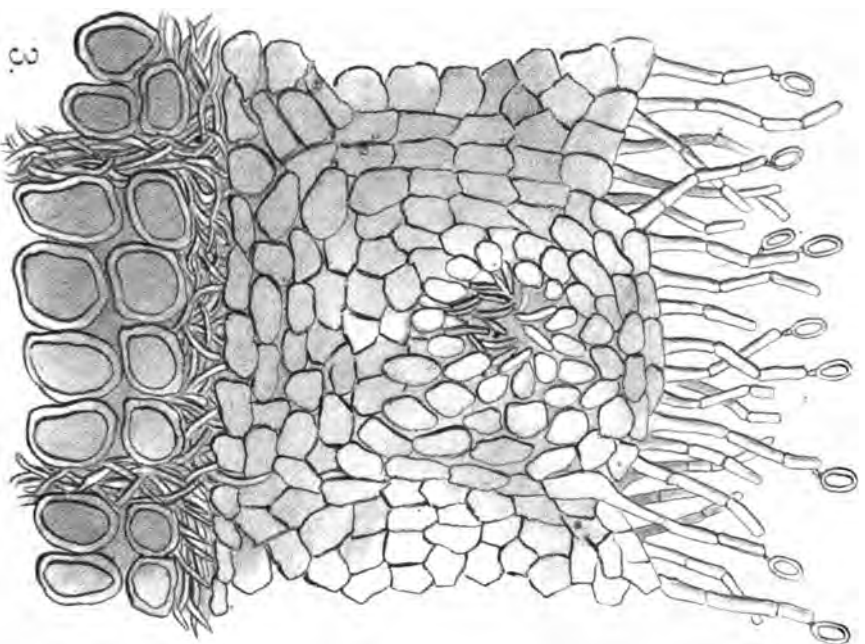
It is said that a good crop of corn on an acre takes up in the grain and fodder about one hundred pounds of nitrogen, fifty pounds of phosphoric acid and ninety pounds of potash, and a crop of three or four hundred bushels of apples from an acre would take up nearly the same elements, perhaps more potash. We would naturally jump to the conclusion that we must put these manurial elements into our soil to produce these crops.

But we long ago learned that it is not best and cheapest in all cases to do so. What shall we apply? A learned professor of one of our

2.

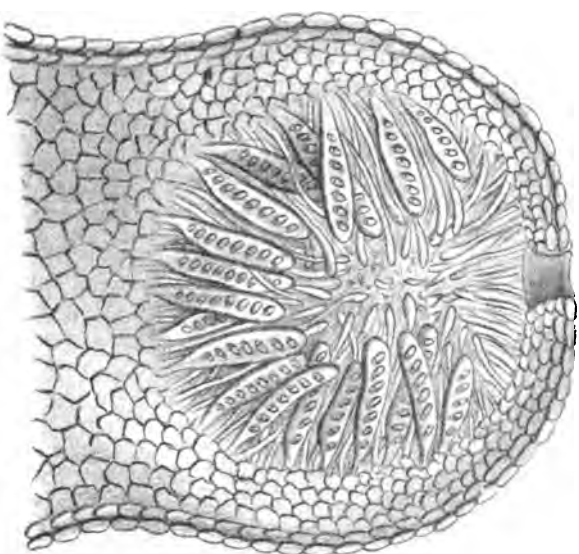


Section of Choke Cherry Stem, showing the Mycelium before it has reached the surface.

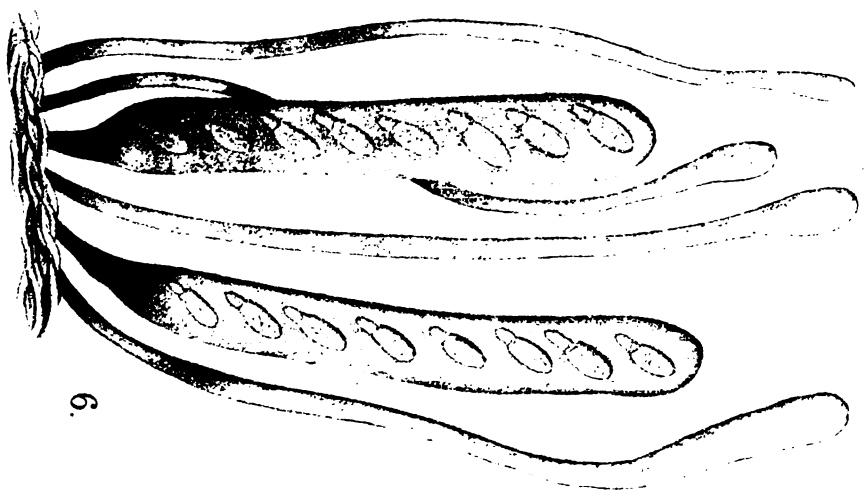


Section of Choke Cherry in May, showing the Conidia on the surface bearing spores.

Conidia, greatly enlarged.



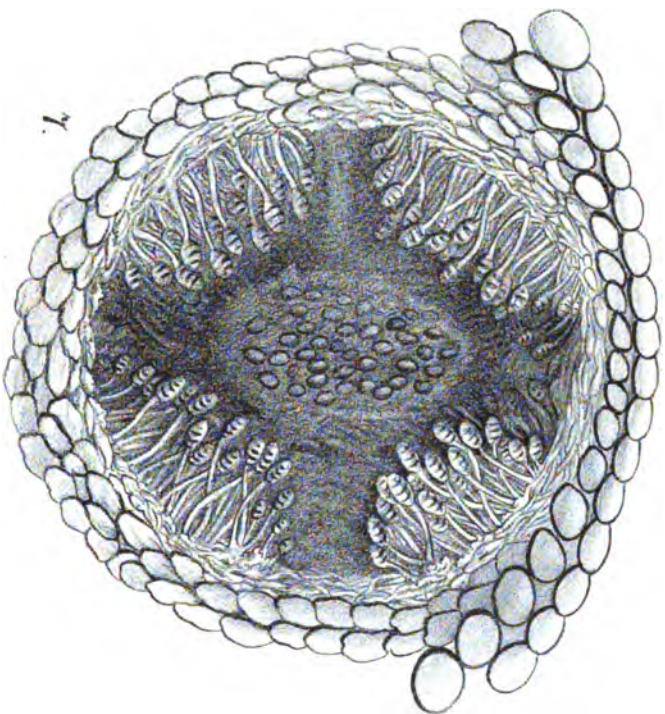
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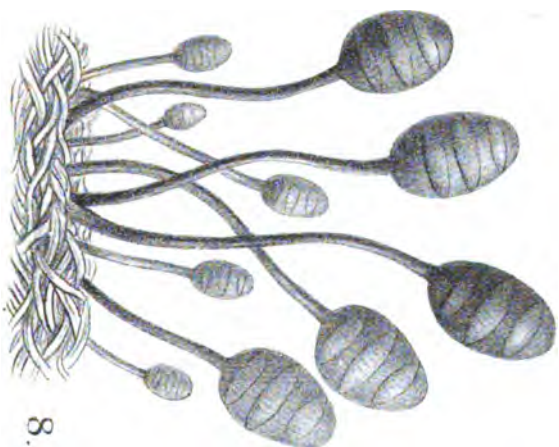
6.

Cross-section of a Perithecium bearing Asci in the center

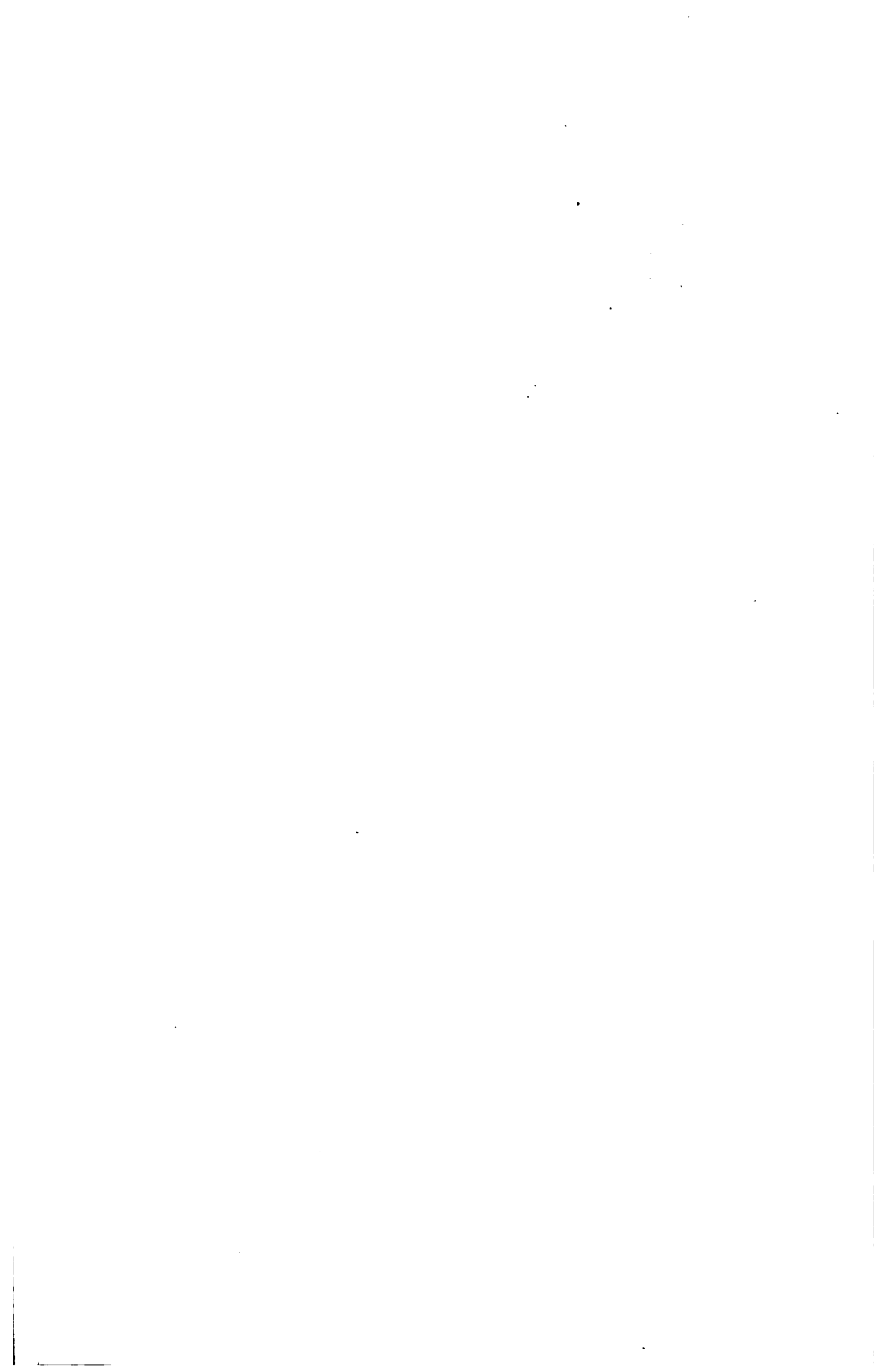
Asci enlarged, showing eight ascospores in each.



Section through a cavity containing Stylospores.



Stylospores, greatly enlarged.



agricultural experiment stations when asked by a farmer what he should apply said he did not know. And if a chemist could not tell, how should we?

But by experience and observation we often learn things of value that science but imperfectly reveals to us.

Many years ago large portions of southern Lancaster and York counties were abandoned because they no longer produced crops. These have been found capable of improvement. I have known some of this land, too poor to produce weeds, and that would not have made fifteen bushels of corn to the acre, that by a single application of a fertilizer containing phosphoric acid alone produced over fifty bushels of corn. Experience has shown that on this micaceous soil, phosphoric acid is the cheapest and best corn fertilizer.

This does not teach us which is the best and cheapest horticultural fertilizer, but it may give us some idea of where to look for it.

Unfortunately, experiments in manuring orchards have not been so extensively and carefully made as to enable us to say what is best for certain soil formations. The successful tree growers of this society can aid us much when in giving their formula of manuring they also state whether their soil is mica, limestone etc. From this corn experience I take it for granted, that a tree fertilizer that has proven effective in a named soil, micaceous for instance, will do so in a great degree in all micaceous soils.

If I had been asked which is the best horticultural fertilizer I would have said bone. Bone contains all the elements that the plant needs, and it has none of its elements in such excess as to do serious damage. It is safe to apply, sure to do good service, and it is only when the word *cheapest* comes to be considered, that we cease to say bone, bone, bone.

In fertilizing for the peach my own experience would suggest the use of South Carolina rock and kainit. My soil is micaceous. I have no evidence that the extensive ammonia in bone is an advantage. Rock and kainit cost only about half as much as bone. I know that the mixture makes thrifty peach trees. The great bulk of kainit is common salt. We are somehow drifting into the idea that salt is good for the peach orchard. Why, or how, I don't know—certainly not as plant food. Perhaps as a fungus destroyer, or as a destroyer of the black root aphid. It takes a good deal of salt to injure the peach. I saw enough put around a tree to keep all weeds from growing during the summer. It did not appear to harm the tree.

The cheapest and best fertilizer for strawberries is one that contains about ten per cent. phosphoric acid, four to five per cent. ammonia and about six per cent. potash. Owing to the brief time between commencing to grow in the spring of the year to the time of ripening in early summer the action of the fertilizer must be quick, and this is accomplished by the ammonia.

Hoping these straggling suggestions may bring out some ideas of what constitutes the best and cheapest horticultural fertilizer, the foregoing is respectfully submitted.

CASPER HILLER.

NUT CULTURE.

Mr. PANNEBAKER. I would like to learn something about nut culture. Will Mr. Engle give us some of his experience?

Mr. ENGLE. There is no doubt in my mind as to its success and im-

portance. Some fifteen years ago I bought some very large chestnuts and planted them, but never succeeded in getting any trees. About the same time a friend in Philadelphia sent me some cions of a cultivated variety which he named "Great American," which we are now disseminating under the name of "Paragon." I have also planted the Japan chestnut, but find there are different varieties or strains being sold as "Japan" chestnuts. Have also fruited "Numbo" and consider it and "Paragon" almost equal to the common American chestnut in sweetness and flavor. Of all the varieties I have grown none bear so early and profusely as "Paragon." Have sent nuts to a number of our prominent horticulturists who have pronounced them equal to any in quality. I would not recommend any one to plant nuts and attempt to grow from seed. It is best to propagate by grafting so as get them true to name. I am satisfied there is open a wide field for nut culture, and at as good profit as fruit growing. Nuts like Paragon and Numbo will bring twenty, thirty and even forty cents per quart. It is a little difficult to graft, and the demand for trees is far above the supply. I do not see why the hillsides of Juniata county could not grow the finest of chestnuts. I have some grafted two years ago on common chestnut sprouts on the lands of Mr. Smith near McAlisterville. Instead of growing the trees for rails and field they will be grown for nuts. Have now some six acres near home ready to graft this spring, and in ten years expect to have a chestnut orchard that will yield handsome returns. The industry is just in its infancy and those who embark in it will not regret it. They should not only be grown as a luxury but as food. I want no greater luxury for breakfast than a plate of boiled chestnuts. I would like to know by analysis the food value of the chestnut.

Mr. RUPP. Is it hardy, and how early does it ripen?

Mr. ENGLE. It ripens a little earlier than than our common chestnut. As to its hardiness, I have had but one report of its being winter killed, from a gentleman in Ohio. A gentleman in New York reports that ten degrees below zero did not injure it on his grounds. It has been entirely hardy with us during the time we have grown it, some fifteen years. The trees probably will not grow as large as our natural chestnut, owing their early and profuse bearing. The Paragon is apt to overbear and we frequently thin them out. They have never failed to bear some nuts. Trees of bearing size can be grafted. We have grafted branches as thick as my arm. Have never had much success with root grafting.

Mr. BARTRAM. I have some trees that do not bear. Others yield fifty dollars worth from a single tree. I would like to know how to graft successfully. Out of one hundred trees grafted only four grew.

Mr. ENGLE. We usually graft when three-fourths to one inch thick. They are cleft grafted.

Mr. THOMAS. We have had fair success in grafting chestnuts, by not allowing trees or branches to get too large. Of our last grafting about three-fourths grew. We usually graft about May 1.

Mr. ENGLE. No safe rule can be laid down as to proper time for grafting. Have had success with both early and late grafting.

Mr. BARTRAM. I can corroborate what friend Engle has said in regard to proper time for grafting. Some grafted a month later than others and all did equally well.

OFFICERS APPOINTED.

The president announced the following appointments for the year.
Professor of Botany, Thos. Meehan, Germantown.
Professor of Entomology, Dr. S. S. Rathvon, Lancaster.
Professor of Horticultural Chemistry, Prof. S. B. Heiges, York.
Professor of Ornithology, Dr. B. H. Warren, West Chester.
Chairman General Fruit Committee, Cyrus T. Fox, Reading.

THE QUERY BOX.

There were but few questions in the Query Box, and they were read by the secretary and briefly discussed.

(1) "Can we do anything to eradicate the grub worm and lessen its attacks, especially upon the strawberry?"

Mr. BRINSER. The only way I know is to catch them, but when we know where they are they have done the mischief. They feed on small fibers from the main roots, and when these are eaten off the plant dies. If all are not eaten off, the plant is injured. On one of my plots half the plants have been destroyed. It is a question in which all strawberry growers are concerned.

Mr. BARTRAM. Was ground in sod previous to planting in strawberry berries?

Mr. BRINSER. No; the preceding crop was corn.

Mr. BARTRAM. Some years ago I planted a strawberry bed, and had many plants destroyed by grub. It had previously been corn ground. I have since then been advised to use ground that had had other crops after sod.

Mr. ENGLE. I am satisfied that corn after sod will have a good effect. Stable manure is a kind of a harbor for the grub.

2d Question. "Would it be advisable to dig peach trees in the nursery in January if weather is favorable, and they show signs of starting?"

Mr. BRINTON. If they push too much it would be advisable to dig and heel them in. It would very much depend on the weather however.

3d Question. "How can we prevent the depredations of the curculio on the peach?"

Mr. SMITH. We consider them rather a blessing than anything else. They thin the fruit and keep trees from overbearing.

Mr. BARTRAM. There is a party in New York who said he would not grow plums if not for curculio.

Prof. BUTZ. Those who have tried find spraying as good for plums as for apples. Jarring is a good practice, but spraying is gaining in favor. Use a spray of one-half pound London purple to one hundred gallons water, with a field pump or hand syringe.

The PRESIDENT. Is not this objectionable on the peach on account of its wooly skin?

Prof. BUTZ. No danger if several rains follow application, one spraying is enough if no rain for five or six days. If rains it should be repeated in ten days.

Mr. DAVIS. Have been trying to raise plums but have not been successful. Have some wild goose plums that bloom freely, but never bear.

THE NATIONAL FLOWER.

The following question from the printed programme was read by the president.

Shall we have a national flower, if so, what?"

In reply to this question the following letter from Prof. Parsons, was read by the secretary:

FLUSHING, N. Y., *January 6, 1890.*

E. B. ENGLE,

DEAR SIR: In answer to your second question, "shall we have a national flower?" there is much to say on both sides. We have already a figure of liberty, a national bird, and the well-known figure of Uncle Samuel.

Some would think that more than this would be "embarrassment of riches."

As a matter of sentiment I quite incline to have a national flower, although in these peaceful times it could scarcely be a rallying cry like the Lillies of France or the Rose of Lancaster. Then, what shall it be? First, it must be thoroughly and distinctly American, indigenous nowhere else. Second, it must grow well over the larger portion of America. Third, it must be unique and definite in its form and sufficiently large to be easily recognizable.

I know of only one flower that will meet these requirements, and that is one that charms all beholders, by its evergreen leaves, the exquisite form of its single flower and the glowing splendor of its masses—as Professor Agassiz once told me "it is the neatest flower that grows." That flower is the *Kalmia latifolia* or Laurel.

In answer to your inquiry as to fruit in this section, this is so poor a fruiting region that my opinion would not be of value.

Plums, apricots and nectarines are rendered worthless by the curculio, and cherries die from some unknown cause when ready to bear. Peaches are almost destroyed by the Yellows, other fruits do well.

Yours truly,

S. B. PARSONS.

Mr. Fox. As a lover of flowers, and having some experience in their cultivation, I to think we should have a national flower, but not the "Laurel." There is, however, a flower that grows from Maine to Oregon, the "Golden Rod," accepted by many as the emblem of the national flower of this country.

During the morning session the following resolution was offered and its consultation postponed until the arrival of Col. McFarland.

Resolved, That this horticultural society now in session appoint a committee to draft a bill and present the same to our next legislature which will convene in the city of Harrisburg, in January, 1891, for the enactment of a law for the prevention of, or stamping out the disease known as Yellows in peach trees in this commonwealth.

The Colonel having arrived I now wish to call up the matter. Michigan and Delaware have similar laws, and I hope to see such an act passed by our legislature.

Mr. JAMISON. Last winter I wrote to Michigan and got a copy of their act referred to. I spoke to our member and he promised to favor it. There are members here who represent a number of counties and who, by writing or speaking to their representatives, could aid in securing the legislation referred to.





HENRY SNYDER

The above seedling apple has been exhibited, and has received favorable mention at several of our meetings, and Mr. Snyder, the originator, sends the following brief history and description: Origin, Granville Township, Mifflin Co., Pa., on the premises of Henry Snyder, where it commenced bearing in 1885, and has borne annual crops since, until the present year (1890). Though it bloomed very freely this season, the fruit has nearly all dropped off. Tree a thrifty though not vigorous grower, of somewhat spreading habit. Fruit sub-acid, tender and good; hangs well to the tree, and will keep until March or April.



An amendment authorizing the president to appoint a committee of five on legislation was prepared and adopted, and the resolution as amended was unanimously adopted.

Col. McFARLAND. I was scarcely able to get here and am hardly able to take part in our work. As to report of committee on legislation no bill was prepared or presented and nothing has been done. I have prepared a report on orcharding which I am not able to read, but which I will submit to the secretary.

As to report on "Cold Storage" the system now used is the right plan but too costly for general use. I am informed that in Europe they have cold storage plants that can be put into a kitchen and cost only about one hundred dollars.

Here the machinery is heavy and costly, costing five thousand dollars to twenty-five thousand dollars.

Mr. E. W. Thomas, chairman, submitted the following:

REPORT OF COMMITTEE ON NOMENCLATURE.

Your committee have carefully examined the fruit and other things on exhibition and desire to submit the following:

Mr. Leonard has thirty-four varieties of apples, two of which are seedlings and three are wanting a name.

John McMeen, eleven varieties of apples. Elias Smith, three varieties of apples, one plate of dried peaches, one case of dried fruit and two jars of canned fruit. R. D. Campbell, seven varieties of apples, and one plate of pears.

W. M. Pennebaker fourteen varieties of apples. Henry Snyder five varieties of apples among them a valuable seedling of excellent quality named Snyder apple by the committee.

W. & S. Ulsh, three varieties of apples. Edwin Davis six varieties of apples and three plates of peaches which have been preserved in alcohol.

John F. Boyer, one plate of seedling apples. John S. Smith, one plate of large seedling apples. Jonathan Zook, two plates of apples. Jacob Hower, one plate of York Imperial apples. E. C. Brinser, one plate of Paragon chestnuts grown on a two year old tree.

Wm. Winy, one plate of the old Grindstone apples grown in the summer of 1888 and kept until now in an ordinary ice-house. Jos. T. Smith & Bro. one plate of handsome specimens of the Paragon chestnut.

The ladies of Mifflin will please accept the thanks of this association for placing on exhibition these specimens of Geraniums, Begonias, Coleus, Impatiens Sultani and Calla lily.

We are indebted to Wm. P. Brinton of Christiana, Pa., for a vase of beautiful cut flowers consisting of Calla lily, Garfield and Hinzies White carnations, La France, Perle, Bennett and Bride roses, and a new double pink Bouvardia a sport from A. Neuner. This new Bouvardia is destined to take a high rank among worthy new flowers for the cut-flower trade.

(Signed by committee)

EDWIN W. THOMAS,
DANIEL D. HERR,
HENRY S. RUPP,
I. C. LANTZ,
T. A. WOODS.

On motion report was accepted.

Mr. WHITE. I see on our list of "Topics for Discussion," the sixth question as follows:

"What are the best varieties of grapes for winter use and how can we preserve them?"

I would like to hear this question discussed.

Prof. HEIGES. I had about nineteen varieties of grapes at York, but have not lived there for eight years. Have only two vines at Camp Hill. All kept until consumed, and scarcely any rot. Both vines are Concord, and we bagged every bunch. On one vine about five per cent. of every bunch rotted. On the other I applied a mixture used on my potatoes, similar to "Bordeaux mixture," with good results. It consisted of one pound sulphate of copper, one-fourth pound Paris green, six pounds lime, and thirty-two gallons of water. Used this on potatoes as a fungicide and insecticide, also on one grape vine, both of which were planted same day. On vine treated with this mixture, not a single grape rotted. I am led to believe that this formula will prevent rot, and propose to continue experiments in the future. Also found it a preventive of potato rot. On the plot on which it was applied, I did not lose a peck by rot, while within four hundred yards of me, a gentleman who had the same variety lost his entire crop.

As to keeping grapes I have had no difficulty with any kinds. Would cut out all defective berries, lay on garret floor and cover with paper. Good fresh Concords and Catawba grapes are now offered for sale in the Harrisburg markets.

Mr. ENGLE. To keep well, grapes must be grown to perfection.

Mr. KREADY. I do not know any grape that can be kept as easily and as long as "Keystone" and "Daisy." Have kept them in paper bags until March while others kept only until the holidays.

Mr. BARTRAM. There is no advantage in keeping grapes except for own use. They can be grown and kept so much better in the lake region. In my vineyard Niagaras, Worden and Brighton did well.

The PRESIDENT. I have never found it profitable or advisable to keep grapes after season.

ANNUAL STATEMENT OF THE TREASURER.

[Having mislaid several of his vouchers and papers the following statement was not submitted during the sessions of the annual meeting, but was referred to a committee of audit, consisting of Prof. S. B. Heiges, J. E. Hershey and Maurice Leonard, with power to act in the interim whenever report was submitted.—E. B. ENGLE, Secretary.]

J. HIBBERD BARTRAM, treasurer, in account with State Horticultural Association of Pennsylvania.

1889.		Dr.	
January	1,	To cash on hand as per last report,	\$385 25
	17,	To dues from members,	\$54 00
	17,	To dues and postage, per E. B. Engle,	11 50
February	28,	To dues from members, per C. T. Fox,	51 00
April	18,	To dues from members, per E. B. Engle,	6 25
June	1,	To dues from members to date,	5 00
			<hr/>
			127 75
			<hr/>
			\$513 00

		CR.	
1888.			
January	16,	Paid E. B. Engle, as per bill,	\$34 20
	16,	Paid E. B. Engle, salary for 1888,	50 00
	17,	Paid hall rent, Lewistown,	15 00
	17,	Paid W. M. Pannebaker, as per bill,	1 66
February	28,	Paid C. T. Fox, salary and expenses, as per bill,	51 00
April	18,	Paid E. B. Engle, as per bill,	30 25
			<hr/> 182 11
			<hr/> \$330 89
			<hr/>
1890.			
January	15,	To cash on hand,	\$330 89
			<hr/>

Examined and approved April 2, 1890.

S. B. HEIGES, *Chairman*,
MAURICE LEONARD.

To the President and Members of State Horticultural Association of Pennsylvania :

The undersigned, your committee appointed to examine the report and vouchers of J. Hibberd Bartram, treasurer of the association, respectfully beg leave to report that we have examined the account and compared it with the vouchers, and find every charge proper and approved by the officers, and the balance as stated remaining in his hands due the association.

S. B. HEIGES, *Chairman*.
MAURICE LEONARD.

DO WE PRUNE TOO MUCH?

General Discussion.

Mr. Rupp was asked to explain his method of pruning the apple.

Mr. RUPP. I do not advise pruning the apple.

Mr. ENGLE. The proper time is when the trees are young and but little at a time. The trees should be closely watched and unnecessary branches renewed before they are too large. This does not give them a serious check.

The PRESIDENT. Will Mr. Lantz explain his method of training the peach?

Mr. LANTZ. I do not know much about pruning the apple but think I can manage the peach. In starting the tree we cut to a straight stick, and let three eyes or branches grow the first year. Next year we cut back to two or three buds. The third year we cut back about half the previous season's growth. After this we usually cut back annually about one-third of previous growth, and would continue shortening in every year so long as they continue in bearing. The most important point in pruning is to thin the fruit.

Mr. ENGLE. With all your close pruning you still find it necessary to thin the fruit.

Mr. LANTZ. Yes, when we have a full crop we find it necessary to take off about one-third of the fruit.

Mr. DAVIS. The object is to get the fruit as evenly distributed as possible on the trees.

Mr. BRINTON. We prune to keep in shape, and to keep branches from getting too long.

Mr. LANTZ. We endeavor to prune so that the fruit in center of tree will color as well as that on the outside branches.

Prof. HEIGES. My views on the subject are on record in the reports of this society some twenty years ago. I have made some experiments to ascertain what substance the peach tree took from the soil. If we burn the edible part of the peach we find but little potash, on the other hand if we burn the pit we find a large portion of potash. Excessive fruiting exhausts the soil of potash and wears out the tree.

In pruning apples it is a great mistake to allow branches to grow as thick as your arm and then saw them off. To supply potash I give each tree about a peck of unleached wood ashes, to be followed by another peck later on. So long as I lived in York I grew "Hale's Early" without any rot. I would apply the ashes first about time the pit is being formed and make second application when peach is coloring. I believe one of the causes of failure in peach growing is the absence of soluble potash.

Mr. LANTZ. There is danger of using too much in the shape of muriate of potash.

Prof. HEIGES. No doubt an excessive application would be lost.

Mr. PANNEBAKER. As to growing Hale's Early peaches, some years ago when operating a tannery I had plenty of ashes and had no rot. The fruit was fine and readily brought \$3.00 per bushel.

The president announced the following committee on legislation: Cyrus T. Fox, Chairman, Prof. S. B. Heiges, Joseph W. Thomas, J. E. Jamison, Rev. J. W. White.

Adjourned.

EVENING SESSION.

President Cooper called the members to order at 7.30, and stated that there were still a few topics on the printed list for discussion: on motion the following question was considered.

"Shall we sell our products direct to consumers or through commission dealers?"

Mr. DAVIS. We are not able at all times to sell direct to consumers, so must fall back on dealers and commission men and our experience in some instances has not been satisfactory. Sometimes we find commission men who do the square thing but others do as did the miller out west, "take the grist and give us the toll." Last season when fine peaches were selling at \$3.50 to \$4.00 per crate, we sent about six crates selected fruit to a firm in Pittsburg. In about two weeks they were reported sold at some \$2.00 per crate, and we were informed that if we had sent good peaches they could have realized us good prices. To sell direct to consumers is sometimes pretty difficult to do. In the summer of 1888 we arranged at Altoona to sell direct to consumers, but found that where we could get honest commission men to handle the fruit, we could do as well to sell through them. It behooves us therefore to find out who are honest dealers.

Mr. LANTZ. I was told by some prominent Delaware peach growers that so long as we shipped to commission men we would be at their mercy. They state that since they grew large crops, commission men

and dealers came right to the orchards and contracted for them. We want to get them to come here and we will have competition among buyers.

In Delaware they have a fruit exchange, in charge of an agent who attends to the sales.

Mr. ENGLE. It is almost impossible to sell direct to consumers. Much has been said, and with reason too, about the imposition of commission men. I believe it is better to sell through commission men if they do what is right. Cannot say I am in favor of wiping them out.

AGRICULTURAL AND HORTICULTURAL INSTRUCTION IN OUR PUBLIC SCHOOLS.

Prof. Heiges made the address of the evening on the above topic, speaking substantially as follows:

Ladies and Gentlemen: I know what I shall say this evening will be far in advance of our educational status, unless more shall be done in the immediate present than has been done since the organization of our public school system.

During an experience extending through thirty-five years as teacher in our public schools, academies, normal schools and universities, I have carefully and constantly studied the various forms of instruction adopted, and many defects and wants have impressed themselves upon me.

Much that is useless receives the most careful attention, simply because it is claimed as a means of mental discipline, whilst discipline could be obtained by considering other subjects, a knowledge of which would be of inestimable value in practical life.

The human intellect consists of various faculties, the development of which depends not so much upon the *subjects* presented for investigation as upon the *manner* of investigation.

Hence, if, in our educational processes, subjects would be chosen, the investigation of which would produce an equal degree of mental development as would purely theoretical means, and, at the same time, the individual to be educated should acquire a fund of knowledge that could be turned to daily account in the every-day pursuits of life, our education would become more practical, more profitable than is the education of the present. Therefore we advocate the investigation of such subjects as interest the masses, and that constitute the basis of our various pursuits, trades and callings. Prominent as means of mental culture for our rural schools stand agriculture and horticulture.

To draw the line between agriculture and horticulture is difficult.

Both have to do with vegetable products, both have to do with the soil, and it is not easy to define where one begins and the other ends.

Agriculture is from two Latin words, signifying "plowing of the fields." Horticulture signifies "plowing of the garden," although some gardens are larger than some fields.

The accepted distinction appears to be that the former appertains to the cereals, grasses, domestic animals, etc.: the latter, to fruits, flowers and garden vegetables.

Perhaps a more closely defined distinction would be that to almost every rural household a garden is attached, whilst farms are less numerous.

If I had the time, I would like to define all the important faculties of the human intellect, and show you how well adapted agriculture and horticulture are to the utmost development of the same.

Much of our education consists in developing those that are not of most importance to our welfare.

Certain muscles are needed in swimming, but if we are never to be near a body of water in which they can be used, their perfect development would be of no use whatever.

Hence, you see the vast difference between a theoretical and a practical education, although all educational means must to a certain extent be theoretical.

It is estimated that about ninety-five (95) per cent. of the matured human family must earn their livelihood by manual labor. If we study this subject of political economy, we will learn that the means of earning a livelihood become more and more difficult every day.

That is, it was easier to earn a livelihood forty or fifty years ago than it is now, as our wants were fewer, our manner of living simpler, and luxuries indulged in by those in moderate circumstances were not thought of.

It is a fact that defies contradiction, that as our population increases and intelligence becomes more general, it becomes more difficult to earn an honest living.

Our public schools import mental discipline of such a character as rather to unfit than prepare our pupils to meet this problem of life.

Much of our instruction may be classified as a system of mental gymnastics designed to astonish beholders, rather than qualify the instructed to make any practical application of his knowledge.

Much of the work is an exercise of memory alone, and the pupil who could best use this faculty, was looked upon as the most scholarly one.

The memorizing of rules, learning to spell thousands of useless words, learning geographical names and positions of places with which we do not have, and never will have, any commercial relations, practicing upon arithmetical problems that have no relation to business, studying grammar rather than language, all this and much more has been honored with the name of education.

About eight hundred words are all that are used by an intelligent person; Shakspeare used but three thousand in his extensive and varied composition.

How useless to have boys and girls waste their time in spelling words that they may never use!

Rather have them become proficient in the use of those that constitute their personal vocabulary.

The knowledge acquired in our public schools is fragmentary and detached, on the principle of the "crazy quilt," and continuity and concentration of thought scarcely can be the results of such desultory instruction.

It were far better to have some continuous system of reading on the subject of agriculture than the detached and disconnected exercises found in our reading books.

"Flint's Grasses and Forage Plants," would be more valuable than any of the text-books used in our schools.

The same criticism applies to the waste of time and energy in the study of geography. What is the use of committing the names of all the islands of Oceanica, the rivers of Africa, or the mountains of Australia? With most of these countries we have little or no traffic,

and a knowledge of the cities and routes of commerce that may be developed, would be far more valuable and practical.

Every country of the far and inaccessible east, even little principalities no larger than Juniata valley, must claim time and attention that could be more valuably applied. A knowledge of the leading commercial nations, their systems of government, religion, etc., the various courses of commercial exchange, would constitute a more thorough fund of information than memorizing the answers to the thousand and one useless questions found in every text-book of geography.

If schools were conducted as they ought to be, we could teach in five years more valuable logical information, than we do in ten at the present and by present methods. I do not know that we shall live to see these much needed changes, but they will eventually claim attention and recognition from those who control our educational interests.

Educational revolutions are of slow development. Thirty years ago I introduced physiology in a certain public school. I have lived to see this important study adopted as one of the legalized branches of study in *all the public schools of the commonwealth*. The same Cutter's Charts are still hanging on the walls of that public school—silent witnesses of the wonderful (!) advance in educational methods made by the present generation.

The spirit of the age demands instruction that shall avail something in the afterlife of the pupil.

You and I are here to-day to learn lessons of vegetable physiology that we should have learned in our school-boy days.

The day has passed by "never to return," when the farmer can depend on his crops of wheat, oats, corn or barley, to gain him a competence. The system of agriculture has ceased to be profitable in the older states.

In one of the New England states, we are informed, there are two thousand farms vacant and abandoned. There are causes for this abandonment which we should investigate.

The soils in some of our western states are almost inexhaustible in fertility. I recently met a farmer from one of the new states, who told me he had raised twenty-four crops of corn in succession on his soil, without any fertilizer, and that the last crop was the best.

Here in the east we have no control over the prices of our cereals, but we may control the prices of all our fruits. Our market for cereals is governed by London, Liverpool and Chicago; we must sell at such prices as they fix, and submit to having our products weighed by the purchaser, an indignity offered to no other class of producers.

The large and fertile farms of the west, where much of the work is done by steam, can, by the competition of railroad companies, deliver their surplus crops at our seaboard cheaper than can the farmers of Juniata valley.

Competition with them is a dead issue! Our children must look in other directions for a means of competence.

They must learn the nature and composition of soils and foods and learn how to raise profitable crops.

Too much ignorance exists upon these subjects, even amongst the most intelligent of our agricultural classes. I have seen farmers feed their horses rations that would produce *milk*, and their cows that which would produce *muscle*. It would be far more profitable for our boys and girls to acquire a practical knowledge of animal and vegetable physiology, than to waste the time they now do upon so much useless matter.

They also should possess a knowledge of the soil upon which they are to labor, its constituent elements, and the effects that different fertilizers would have upon the same.

The science of chemistry would enable him to decide all these problems, and, also, all the various food problems in an intelligent manner for himself. The unwise application of artificial fertilizers costs annually more than would be required to maintain a good practical farm school in each county of our state. As the mental power of some royal families has become exhausted, through want of fresh and purer blood, so some of our royal sorts of fruits and vegetables have become exhausted.

Our Mercer and Peachblow potatoes have degenerated; some of our strawberries have *run out*; some of the apples, peaches and pears of our boyhood days are no longer profitable; and favorite wheats and corns have been discarded.

How advantageous would it be if our sons and daughters were taught the laws of hybridization and cross-fertilization and thus be enabled to produce new varieties as older ones lose their vigor. There is poetry in all farm operations, and all that is done in the household, more refining than the poetry of fiction, because it is the poetry of God's unchangeable laws.

In the chemistry of bread-making, of preserving fruits, of canning fruits and vegetables, there is much that is not understood by the products of our graduates "peoples' colleges," but that all could know if they were taught as they should be.

Where are our older boys and girls—those about to leave the school-room and about to enter upon the active duties of life—taught anything upon the subject of cream raising, proper temperature of milk and cream, length of time to ripen cream, temperature at which to churn, processes of working butter, and the many little things that go to make sweet, granular, aromatic butter? Echo answers, where?

If our boys and girls were taught the philosophy of farm labor, they would not be so anxious to desert it for other callings, and our farms would remain in the possession of our children and our children's children.

There is no other calling in which the physical sciences (nature's laws) enter so largely as in that of farming, and at the same time is there any one department of instruction so thoroughly ignored in our public schools.

But I may weary you if I should point out all that our public schools can and should do for the rural communities of this grand old state.

That the age demands radical changes in our methods of education, is evident from what the Drexels and Williamsons are doing for industrial education near Philadelphia. If a knowledge of the industrial arts is essential for city boys and girls, as seems evident from what is being done in that direction, how much more necessary is it for boys and girls of rural districts!

See to it, brother farmers, that the men you elect to represent you in our halls of legislation are pledged to the establishing of at least one school in each district in which the subjects to which I have briefly referred this evening, shall be taught to your sons and daughters.

Our agricultural college and normal schools are thoroughly qualified and competent to send out a class of teachers to take charge of these farm schools. Should this be done, then, and only then, shall we reap the full fruition of a system of public schools.

On motion a vote of thanks was tendered to Prof. Heiges for his very able and interesting address.

The following was offered by Mr. Brinton.

Resolved, That the thanks of this association be and are hereby tendered to H. A. Stambaugh, chairman, Mifflin, Pa.; W. M. Pannebaker, Lewistown, Pa.; I. C. Lantz, Thompsontown, Pa.; J. T. Smith, McAllisterville, Pa.; E. B. Engle, Waynesboro', Pa., committee of arrangements, for the able manner in which they prepared for our meeting; to the exhibitors for the more than ordinarily large and fine display of fruits; to the press of Mifflintown for their report of our proceedings; to the hotels and railroads for reduced rates; to the citizens of Mifflintown for their attendance and interest in our meetings, and to the officers for the ability and dignity with which they served the association, and to the ladies for their presence and for the interest they manifest in our deliberations.

Prof. Heiges moved to amend by including the county commissioners of Juniata county in the resolutions, which was agreed to, and the resolutions as amended were unanimously adopted.

MR. BRINTON. I notice among topics for discussion question No. 4, "Should horticulturists demand protection against foreign fruits?"

While this is a question of interest and importance to all horticulturists, it is one that could hardly be discussed free from politics and it had probably better not be taken up. As for myself I think before many years agriculturists will change their minds materially on the tariff question.

MR. MORDECAI BARTRAM. This is the first time I have met with this association, having come some two hundred miles to attend your meeting. Before we adjourn, I wish to refer to the pleasure, socially, these meetings have afforded me, and the uniform kindness and courtesy with which the members of this association have treated each other. The work for which we have met is about finished and it seems to me we had best not prolong our session, but adjourn while the good feeling prevails and while we are under its influence.

MR. ENGLE. Mr. Bartram's remarks are a compliment to this society, and I have frequently heard, in a private way, the same flattering remarks paid the class of people who constitute our membership and attend our meetings. I feel that we can congratulate ourselves that not only our friends but strangers and outsiders speak so well of us.

The president announced that the standing committees for 1890 would be continued same as previous year. He also announced the following committee of arrangements for next annual meeting:

Chairman, Calvin Cooper, J. H. Yeager, Daniel D. Herr, Jos. H. Witmer, E. B. Engle.

The president tendered his heartfelt thanks to the members and others for their kindness and courtesy. He had been present at every meeting for the past ten or twelve years, and does not recall anything but kind and pleasant words during all that time. Gentlemen, I thank you.

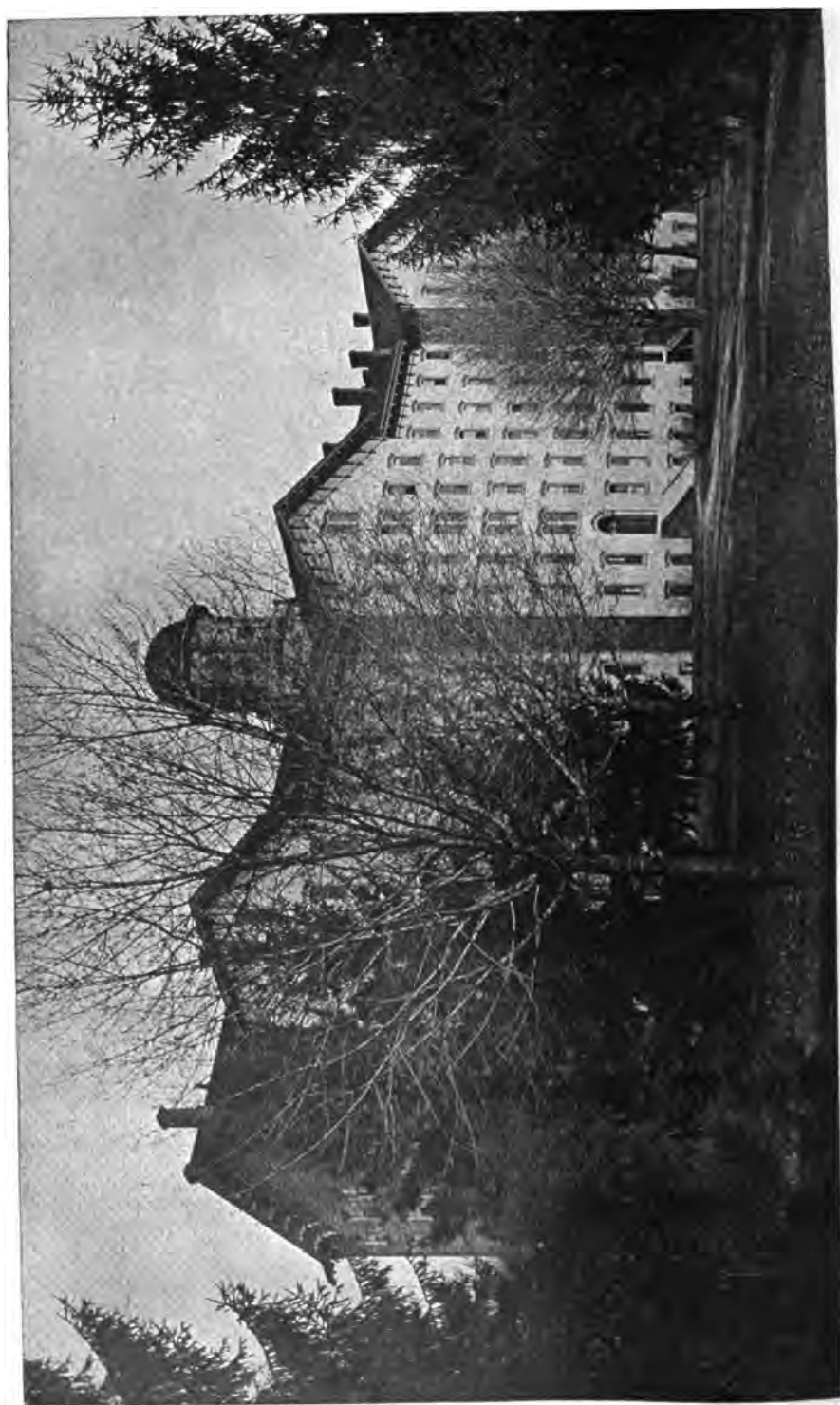
Adjourned.



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THE PENNSYLVANIA STATE COLLEGE. (MAIN BUILDING.)

ANNUAL REPORT

OF

THE PENNSYLVANIA STATE COLLEGE.

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DESCRIPTION OF THE INSTITUTION.

THE PENNSYLVANIA STATE COLLEGE

Was organized in 1859 as the "Farmers' High School," and its object then was to give an exclusively agricultural education. Its organization, however, was upon a collegiate basis from the beginning; and its name was, in 1862, changed to "The Agricultural College of Pennsylvania." Subsequently, the legislature of the state having appropriated to this institution the income from the proceeds of the national land-grant, and the scope of its work having thus been necessarily enlarged, its name was, in 1874, again changed, and it has since been known as "The Pennsylvania State College," a name which indicates the intimate connection of the college with the state government, and its relation to the people of the whole commonwealth.

The scope of the institution, as now organized, cannot be better stated than in the following comprehensive words of the act of congress:

"The leading object shall be, without excluding other scientific and classical studies, and including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts, in such manner as the legislature of the state may prescribe, *in order to promote the liberal and practical education of the industrial classes in the several pursuits and professions in life.*"

This act of congress was, in 1863, "accepted by the State of Pennsylvania, *with all its provisions and conditions*, and the faith of the state * * * pledged to carry the same into effect."—*Laws of 1863, p. 214.*

Based upon this broadened foundation, the special work of the State College is INDUSTRIAL EDUCATION; that is, the training of youth in those branches of learning which lie at the foundation of modern industrial pursuits. In accordance with the purposes of its founders and the terms of its original charter, it aims to give special and prominent attention to agriculture, both theoretical and experimental. But it also provides a "liberal and practical education," in the leading branches of mathematical, natural and physical science, in order to prepare youth for the several pursuits and professions in life," as the laws of congress and of this state distinctly require. While the college, therefore, is no longer exclusively agricultural, it is doing more in the direction of progressive and scientific agriculture than when that was its principal object; and, at the same time, it has greatly increased its subjects and courses of study, and its teaching and illustrative equipment in other directions. "Without excluding classical studies" entirely, it aims to teach the various sciences in such a manner as to show their applications in the more important industries, and thus to combine theory with practice. Such a course of training, aiming to cover even a part of the vast field of modern scientific knowledge, must necessarily be somewhat prolonged. But its results are showing themselves, in a most gratifying way, by the readiness with which our graduates find honorable and remunerative employment.

The range of work is shown, as far as the limits of space properly allow, in the following schedules and descriptive statements. It is con-

fidently believed that few, if any, institutions in the country furnish an opportunity for obtaining an advanced scientific education, of equal extent and thoroughness, at so moderate a cost, and with so many incidental advantages.

Location.—The institution is situated in the village of State College, Centre county, nearly twelve miles southwest of Bellefonte, and about equi-distant from the extreme parts of the state. Its position in the midst of a broad, rolling valley, with Muncy mountain on the north, Tussey mountain on the south, and Nittany on east, secures a varied and remarkably beautiful landscape and a healthful climate.

A special act forbids the sale of intoxicating drinks within two miles of the college, and all its surroundings are exceptionally free from demoralizing influences and from temptations to extravagance.

The main college building is a plain and substantial structure of magnesian limestone, two hundred and forty feet in length, eighty feet in average breadth, and five stories in height, exclusive of attic and basement. It contains the public rooms—such as chapel, library, society halls and class rooms—and a large number of dormitories. The building is heated with steam; it is furnished on every story with an inexhaustible supply of pure water from an artesian well, and is lighted throughout with electricity. The sewerage system is frequently and carefully inspected, and the unusual exemption of our students from every form of sickness justifies the statement that the sanitary condition of the building is very nearly perfect. The facilities of the college have lately been increased in several directions, by the erection of a botanical building with greenhouses, a chemical, physical and electrical laboratory, an armory, and a commodious cottage for young ladies.

Campus and Farm.—The tract of land on which the building stands contains nearly three hundred acres. Of this, about fifty acres in the immediate vicinity of the building constitute the campus, and furnish recreation grounds, sites for professors' houses, and other needful buildings, etc., the whole being tastefully laid out and adorned with trees, shrubbery, flower gardens and walks.

Practical Training.—The college has, from the first, sought to combine practical with theoretical instruction, and thus to fix in the student's mind a knowledge of both methods and principles. With this end in view, a portion of each student's time has been set apart for this training, and the number of subjects in which such instruction is given, and the apparatus for it, have been increased until it covers an extensive range of topics, as will appear from an examination of the several schedules. A portion of this training is largely technical, and so is almost wholly connected with these courses. Other parts, however, are so general in their character as to be appropriately required of all students. Among these, the following may be mentioned for illustration: *Book-keeping*, so important for the right conduct of all business; *Drawing*, free-hand and mechanical, needed by individuals in all employments and professions; *Military Drill*, required by the law of congress, and helpful in securing right habits of body and mind; *Mechanic Arts*, in which are learned, among other things, the making of plane surfaces, correct angles and joints, and the care and use of tools; *Horticulture*, where instruction is given in all ordinary operations belonging to fruit-culture, such as pruning, grafting, budding and propagating by cuttings and layers; and *Surveying*, which acquaints the student with the instruments of the art, and trains him to determine points, distances and areas. Some of these practicums not only give knowledge of almost universal

use, but also serve a good purpose by developing, during the early part of the course, tastes and aptitudes which may determine the students' choice of a technical course and of his life-work.

In the technical courses, special lines of practice have a large amount of time given them, proportionate to their importance or looking to subsequent professional use. Each practicum is directed by an instructor who is familiar with both the theory and the practice and their mutual relations. The instruction is so largely personal that an earnest student may advance far beyond the average attainments required as a minimum. The experience of the college adds from year to year to the evidence that this training is highly valuable, and in directions which no one can foresee, even when the pupil does not, at the time, fully appreciate its importance.

The growth of the college for the last few years has been a great gratification to all who are interested in it, and there is now every indication that the institution has entered upon a career of prosperity fully equal to the best anticipations that were entertained by those public-spirited and far-seeing men who laid its foundations. This result has been brought about by the concurrent action of the State of Pennsylvania and the United States. The former, after a long period of neglect, began to make provision for the rapidly-increasing wants of the college, and within the last four years has made generous appropriations for new buildings and equipment. These appropriations have been expended by the trustees in the erection of new buildings for several departments of the college work, rearranging space in the one main building previously occupied, and providing an adequate equipment for the different branches of work.

In this way better provision has been made for the agricultural department, the military department, the botanical department, the chemical department, the department of physics and electrical engineering, the department of mechanical engineering, the department of civil engineering, and the department of zoölogy.

Within the last year increased teaching force has been provided in the departments of electricity, chemistry, mechanical engineering, zoölogy, civil engineering, mathematics, the English language, and industrial art and design. Steps have been taken for the immediate establishment of a department of mining engineering, which is to be in full operation in time for the opening of the next college year.

Besides this direct increase of teaching force and extensive purchases of apparatus for the old departments, enlarged provision has been made for the needs of the library and reading room, both of which have been put in ampler and better quarters, and the library catalogued throughout.

Even these changes have hardly kept pace with the immediate and urgent needs created by the increased number of students, and further additions to buildings and equipment are still imperatively required, especially in the engineering departments, every one of which is overcrowded.

The additional aid given to the college by the United States government during the last year places it upon a footing of assured prosperity which it has not hitherto enjoyed. By the law approved March 2, 1887, congress provided for an annual appropriation of \$15,000 a year for the sole purpose of maintaining work in agricultural experiment and research, and the work of the agricultural department is therefore well provided for.

By the new law, approved August 30th, 1890, the sum of \$15,000 for

the first year, to be increased each year until it reaches \$25,000, to be paid out of the proceeds of the public lands, has also been appropriated to the institution in order to increase its facilities for instruction.

This additional appropriation is to be expended exclusively for instruction "in agriculture, the mechanic arts, the English language, and the various branches of mathematics, physical, natural and mechanical science, with special reference to their applications in the industries of life and to the facilities for such instruction."

It is this law that has made possible the increase of the teaching force in several departments already established, and will enable the college to provide still more efficiently for the various branches of science as applied to the industrial pursuits of the state.

COURSES OF INSTRUCTION.

The organization of the college is such that the instruction given naturally falls under several departments, which are distinct, and yet so mutually related as to form, when combined in groups, well-proportioned, systematic and progressive courses of study. The number of such courses is now nine, viz: A General Science Course, a Latin-Scientific Course, a General Course in Agriculture, and six technical courses, designated as Courses in Agriculture, Chemistry, Civil Engineering, Electrical Engineering, Mechanical Engineering and Natural History, respectively. There are, also, three shorter special courses. In the courses in Electrotechnics and Civil and Mechanical Engineering, the studies of the first two years are very nearly the same as in the General Science Course, being slightly varied with reference to the later stages of the work, and the strictly technical studies falling mainly in the junior and senior years. In the other three technical courses the studies *are the same for the first two years* as those in the General Science or the Latin-Scientific Course, at the option of students.

All students, accordingly, who intend taking a regular course (other than in civil, electrical or mechanical engineering) enter the General Science Course, or the Latin-Scientific, at the beginning of the freshman year, continue its studies until the end of the sophomore, and then either complete that course or select the technical course which prepares directly for their chosen work. The studies of the first two years are so arranged as to form a course by themselves, especially adapted to meet the wants of those who cannot take a full college course, but who desire to fit themselves well as land surveyors, or for any of the ordinary callings of life, at the same time acquiring a fair degree of liberal education.

Students leaving at this period of their course receive from the faculty a certificate of their attainments.

The character of the several courses may be briefly indicated as follows:

1. The General Science Course.

The course in general science may be taken as representing the general educational work of the college. It is designed to meet the wants of those who desire to obtain a sound and liberal education through the study of the mathematical, physical and natural sciences and modern languages and literatures, rather than the ancient classics. It provides a thorough training in mathematics and physics (with the option of the calculus in the junior year), a sufficient acquaintance with the leading

branches of natural science (as chemistry, botany, geology, etc.), and as much study of mental, moral and political science as is found in the usual college course, while the literary studies include an extensive reading of French, German and English literature and literary history.

No student can fairly complete this course without having acquired a stock of recent knowledge and a degree of intellectual training which will fit him to enter successfully upon any chosen career, and furnish an effective equipment for the duties of American life and citizenship.

2. The Latin-Scientific Course.

This course is nearly the same as the General Science Course, with the substitution of Latin for the first five terms in place of other studies. The course is shown in full in the schedule of studies. The study of Latin is wholly optional, and while it is not so extensive as in institutions in which classical studies occupy the leading place, it is intended to be given with equal thoroughness and breadth, and is sufficient, both as an instrument of mental training and as a foundation for advanced study, for all the needs of ordinary college students.

3. Courses in Agriculture.

In this subject two courses are provided—a general course and an advanced course. The object of the general course is to meet the wants of students who wish to begin the study of agriculture immediately after leaving the public schools, and for admission to this only a knowledge of the common English branches is required. The object of the advanced course is to give to young men a more thorough *education* at the same time that they are carefully instructed in the relations that the sciences bear to the various branches of agriculture; to give both the mental training that is indispensable to success and the scientific and technical knowledge requisite for becoming efficient workers in agricultural directions, whether as farmers, teachers or investigators. Any lower aim would fail to meet not only the requirements of the laws under which the college is organized, but the progressive demands of the time.

To this end the State College offers to the student of agriculture something more than the meager advantages of a manual labor school, on the ground that otherwise the desired objects could not be attained, and that it is both useless and unjustifiable for a young man to incur the expense of a college course in order to acquire the manual dexterity that could be secured with little cost elsewhere, and that every farmer's son obtains early in life. The aim, in the courses in agriculture, is to teach how the principal branches of physical and natural science are applied to the business of farming, and to afford a thorough and comprehensive knowledge of its principles and methods. They explain the nature of soils and manures, the reasons for and the best methods of tillage, the constituents and characteristics of plants and animals, and the conditions favorable to their development. They combine practice with theory wherever the processes involved skilled labor, but do not consume the student's time in the mere manual process of plowing, planting and feeding.

As will be seen by an examination of the schedule of studies and practicums of this course, the time is fully occupied with instruction in the class rooms, laboratories, orchard, vineyard and field, and no pains will be spared to give the earnest student a high degree of intellectual training, and a thorough, special preparation for the most advanced require-

ments of the farmer's calling. There seems to be comparatively few who desire to avail themselves of the advantages offered by the agricultural departments of technical institutions. It is suggested, however, to those who are ambitious alike of usefulness and distinction, that the field of study and research in the interest of agriculture offers many great and inviting rewards to the diligent investigator.

The studies of the first two years include mathematics, surveying, the general principles of the sciences, the modern languages and rhetoric, with Latin for those who desire it. The direct application of science to agriculture and the consideration of purely technical subjects are reserved for the last two years, after the study has gained a sufficient basis of general knowledge. Instruction is given with the aid of text books, or by lectures alone, according to the nature of the various subjects.

The subjects taught after the beginning of the junior year are progressively arranged, and are grouped under general topics as follows:

Agricultural Chemistry.—The chemistry of soils, of vegetable and animal life, and of processes having relation to agriculture.

Agricultural Engineering.—Including drainage, the building and repairing of roads, foundations, preservation of structures of wood, etc.

Fertilizers.—The sources, composition and manufacture of commercial and farm manures, and their use in the production of crops; soil exhaustion; maintenance of fertility, etc.

Crops.—Implements and special methods related to each farm crop.

Stock Breeding.—The history and characteristics of the various breeds of cattle, and the laws and methods involved in successful breeding.

Cattle Feeding.—The composition of the various cattle foods and of the animal body; the chemistry and physiology of digestion and the laws of nutrition; the kinds, sources and preparation of cattle foods, and methods of feeding for different purposes.

Veterinary Science.—The hygiene of the farm; causes and remedies of the more common diseases of domestic animals.

Farm Economy.—A comparison of the various systems of husbandry, with suggestions as to the business management of the farm.

Dairy Farming.—The physical and chemical properties of milk, and the best methods of manipulating it in the manufacture of butter and cheese; the breeds of cows best suited for dairy purposes; care and management of cows, etc.

Sheep Husbandry.—The origin and characteristics of the different breeds of sheep; the adaptability of each to the various conditions of climate, etc.; and the best methods of management for wool-growing and the production of meat.

History of Agriculture.—The relations of agriculture, past and present, to social and political conditions, and to education, literature and science.

Practicums.—It is intended that the management of the college farms shall be such as is sanctioned by the teachings of science and practice. Of this management in its various details the students of the courses in agriculture are to be observers, taking part in actual operations to the extent that is necessary for proper observation. One object of the practicums is to secure from the student, in all cases, a report of the operations coming under his notice, with a discussion of the principles and a criticism of the methods involved.

The facilities for becoming familiar with the growing of the ordinary farm crops, the use of commercial fertilizers, the manufacture and use

of farm manures and the feeding of animals for the production of meat and milk have been for several years entirely adequate for ordinary instruction; but the establishment of the United States Agricultural Experiment Station has greatly enlarged the work of the college in these and similar directions. While the experiment station is largely occupied in dealing with old problems and investigating new ones as they arise, it is intended to make its resources available, as far as possible, as a means of imparting instruction in the best methods and results of scientific agriculture.

4. Course in Chemistry.

The instruction in this course is designed for those who wish to become practical or professional chemists, as teachers and investigators, metallurgists or manufacturers in chemical industries, or for those who wish to pursue medicine, pharmacy, mining and similar professional or industrial occupations. The extensive and well-equipped laboratories afford ample opportunities for both qualitative and quantitative work.

Methods selected from all approved sources are employed. The work of the junior year is so planned as to give facility in the use of the standard analytical methods, gravimetric, volumetric and electrolytic, and to impart familiarity with the methods for the determination and separation of the substances most frequently met with. In the third term the practicum of the junior class in most of the courses includes laboratory work in determinative mineralogy. It is intended that this practical course, with the few accompanying lectures, shall result in a knowledge of the outlines of the science of mineralogy, and the ability to distinguish the commoner minerals and ores, approximately by the eye, and accurately by the blow-pipe.

In the senior year the time of the student in this advanced course is given, both in class room and laboratory, almost exclusively to chemistry. A series of conferences on chemical technology is held during one term in which special attention is paid to the metallurgy of iron, and to other processes that are likely to come under the observation of the student, or to occupy him after his graduation. In the presentation of the subjects, descriptions and illustrations of modern processes now in actual use are employed as fully as possible.

5. Courses in Civil, Electrical and Mechanical Engineering.

The object of these courses is to give thorough instruction in the studies and practical work pertaining to the three professions. The same studies, to a considerable extent, are necessary to the architect also, and to the mining engineer, and are valuable to any who desire proficiency in the applications of mathematics or physics. The work of the courses is so arranged that students may become thoroughly familiar with the theory and practice of field operations, the use and care of instruments and the work of the drawing-room, and through systematic training may establish a sound basis for future usefulness and success in the higher branches of the profession or any of its specialties. The harmony between theory and practice and their mutual dependence is dwelt upon in order to develop the power to think as well as the ability to execute. To this end experimental as well as rational methods are habitually introduced—as, for instance, while studying the principles from which the resistance of materials is de-

duced, the student verifies them by experiment in the workshop; and in like manner at every stage of the work the applications of principles are taught as the most effective means of acquiring a thorough knowledge of the principles themselves.

During several terms past more than usual attention has been given in the department of physics to the recent important development of electrical science and its extensive practical applications, and a full four years' course in electrotechnics is now established.

6. *Mechanics Arts—Combining Shop-work and Study.*

This course has been in successful operation for several years, thus anticipating the present growing demand for schools or departments of manual training. It is designed to afford such students as have had the ordinary common school education an opportunity to continue the elementary, scientific and literary studies, together with mechanical and free-hand drawing, while receiving theoretical and practical instruction in the various mechanical arts.

The instruction in shop-work is given by means of exercises so planned as to cover, in a systematic manner, the operations in use in the various trades. The object of the course being to give instruction in the use of tools, only such constructions are made as cover principles without undue repetition. The first instruction in carpentering and joining is in the use of the saw and plane in working wood to given dimensions, and a series of elementary exercises follow in order; such as practice in making square joints, different kinds of dovetails, the various tenons, roof-trusses, panels, etc. The instruction in turning and circular section patternmaking is given from a series of models; also bench patterns are made for subsequent use in the foundry.

The foundry course consists in casting from the patterns which the student himself has previously made. Many of the pieces cast from these patterns are used in his clipping and filing work.

In the forge shop are taught the management of the fire and the degree of heat necessary to forge the different metals. Drawing, forming, bending, upsetting, fagoting, splitting, punching, chamfering, annealing, tempering, case-hardening, etc., are taught by means of a series of exercises in which the elements of the iron-forger's art are particularly dwelt upon. Every piece is made to certain dimensions laid down upon the drawing, the article being forged before the class by the instructor, who directs attention to the essential features of the operation, which is then repeated by each student. The course in vise-work includes filing to line, filing to template, free-hand filing, fitting and chipping straight and grooved surfaces in cast-iron, wrought-iron and steel. In the machine shop the student, after having the lathe and its mechanical construction explained to him, is taught centering, tape-turning, chucking, reaming, inside and outside screw cutting, bolt-turning, etc. He is then required to construct some piece of mechanism in which many of these principles are involved.

The drawing of the course extends through the entire three years. This work is looked upon as of the highest importance, and the effort is to make the instruction thorough, practical and of direct utility. Considerable time is devoted to free-hand drawing, as it is believed that it not only assists in mechanical drawing, but is of great service in after years, whatever the occupation.

The mechanical drawing consists of a series of exercises, and such are selected as will be of subsequent use. They are arranged in progressive order, beginning with geometrical constructions involving straight lines and circular arcs only, and ending with the more complex curves, such as the eclipse, helix, epicycloid, etc. Projection is next taken up. The instruction in this is from models, so that the student may have before him the actual object from which the projection is made, and not be obliged to depend upon his unaided conception. After completing this work, he is required to draw parts of machines from actual measurements. For this purpose he is given some piece of mechanism to sketch and measure, and of which, finally, he is to make complete working-drawings.

In mathematics, the instruction covers algebra, plane and solid geometry, plane and spherical trigonometry, land surveying and mechanics, many practical applications being made. Candidates for this course must be at least fourteen years of age, and pass a satisfactory examination in the following subjects: Robinson's Complete Arithmetic (or its equivalent) to ratio, English Grammar (syntax and etymology), Geography and Spelling. A pamphlet giving a much fuller account of this course will be sent to anyone requesting it.

7. Partial Courses.

Students who are fully prepared to enter the freshman class are permitted to take such special course as they may desire, the course being made up from studies taught in a given term or session, and subject, in all cases, to the approval of the faculty. They are required to have the same number of hours of class work and practicums as other students. Subject to these requirements, and to the ordinary discipline of the college, any person is at liberty to select from the entire range of studies such branches as he may wish to pursue, and for such length of time as he may find convenient, the purpose of this arrangement being to bring the advantages of the institution as fully as possible within the reach of every young man and woman in the state. Students are earnestly advised to enter one of the regular courses, and pursue it systematically to the end; but, in cases where that is not feasible, it is intended to make the State College, to the full extent of its resources, a place where any person may obtain that kind and degree of education which is most directly suited to his circumstances and purposes in life.

To those who satisfactorily complete one year or more of such special work, certificates under the seal of the institution are given, setting forth the studies which they have pursued, and their proficiency therein. The provision for partial courses does not extend to the preparatory classes, all studies in them being required.

8. Young Women.

Young women are admitted to all classes, in all courses, on the same terms as young men, but a separate course is also provided containing more of the branches of study that are thought likely to be especially serviceable to them, with less extended requirements in mathematical and scientific studies. Parents who send their daughters to the college may rely upon their being surrounded by kindly and healthful influences under the direction of a competent lady principal.

An attractive and commodious cottage for their exclusive use has been recently erected, in which it is intended to provide the combined freedom and restraints of a well-regulated home.

The course in detail is shown in the college catalogue, which will be sent on application.

AGRICULTURAL EXPERIMENT STATION.

The agricultural department of the college has for several years carried on extensive lines of research and experiment, proper to what is now generally known as an experiment station. In accordance with the terms of the law of congress, providing for the establishment of such stations in connection with the colleges founded on the Act of July 2, 1862, the trustees of the State College have organized the agricultural department under the title of "The State College Experiment Station," and the work will be increased to the full extent of their available resources. The object of the station is to pursue systematic and continuous investigations, but without losing sight of the practical needs of every-day farming. It will endeavor to give assistance to farmers, in solving the problems that perplex and embarrass them, and it earnestly desires their coöperation through full and free correspondence. Bulletins of information are issued quarterly, and will be sent free of charge to all applicants in the state.

All communications to this department should be addressed "Agricultural Experiment Station, State College, Pa."

GENERAL STATEMENTS.

1. *Degrees.*

The degree of Bachelor of Agriculture is conferred upon graduates of the General Course in Agriculture, and that of Bachelor of Science upon graduates of the other four years' courses. The diploma given to graduates of the technical courses contains mention, also, of the special line of technical work pursued.

The degree of Master of Science is conferred upon graduates of the State College, of at least three years' standing, who are known to have been systematically pursuing scientific, literary or professional studies, or who have, satisfactorily to the faculty, studied at least one year in the graduate courses. Higher degrees, such as C.E., Ph.D., D.S., etc., are only conferred at the end of prescribed courses of advanced study, or in recognition of high professional attainments.

2. *Graduate Instruction.*

Persons who have been graduated in one of the *Regular Courses*, or an equivalent course elsewhere, are permitted to enter the college for instruction in an advanced course, consisting of such studies as may, in each case, be approved by the faculty, receiving at the completion of such course the appropriate degree.

3. *Libraries and Reading-rooms.*

The library belonging to the college has about six thousand volumes, embracing scientific and technical works, memoirs, scientific

essays, agricultural and educational works, etc., in English, French and German, forming the foundation of a good scientific library. Considerable additions are made yearly.

The reading-room in connection with the college library offers to faculty and students an ample and well-selected list of scientific and other periodicals, foreign and American.

Donations of books and periodicals are invited from friends of the institution, publishers and authors.

Each of the two students' literary societies has a good library of standard and miscellaneous works, and a reading-room supplied with some of the principal literary periodicals and newspapers of the day.

4. *Free (Senatorial) Scholarships.*

The trustees have established fifty scholarships, one for each senatorial district in the state, entitling the holder to *exemption from all college charges* (except for material used in the laboratories), in any of the REGULAR FOUR YEARS' COLLEGE COURSES. The scholar, male or female, is to be appointed by the senator of the district, after a competitive examination in the studies required for admission to the freshman class (General Science Course), or to the third year of the Course in Mechanic Arts, or to the second year of the General Course in Agriculture. No person is eligible as a candidate who has previously been admitted to any class in the college.

The holder of the scholarship is admitted to the privileges of any of the REGULAR COLLEGE COURSES (*but not the Preparatory or Special Courses*) free of the ordinary charges for incidentals, room rent, fuel and furniture. This allowance amounts, at present rates of charge, to fifty dollars a year, and is continued the entire college course, provided that both conduct and class standing be satisfactory to the faculty. A vacancy may be filled after the opening of the college year, if the appointee's attainments do not fall below the standard of the class at the time of application for admission. For information as to vacancies, time and place of examination, etc., candidates for scholarships should apply to their senator (in whose hands the details of appointment have been placed by the college) or to the president of the college.

5. *Discipline.*

The discipline of the college is intended to be strict, but reasonable and considerate. It assumes that students come here not to spend their time in idleness, but to prepare themselves for useful and honorable careers in life. The aim of the faculty is to lead students to cultivate habits of steady application, self-control, a high sense of honor, truthfulness, and an interest in maintaining the purity of the moral atmosphere of the institution. *Those who are not disposed to support heartily a discipline of this kind are urged not to apply for admission.* Students whose influence, after fair trial, is found to be injurious to good scholarship or good morals, will be removed from the institution.

6. *Expenses.*

No charge whatever is made for tuition, except for special instruction in music.

Incidentals.—Each student, whether from a distance or a resident in the neighborhood, is required to pay seventeen dollars a year for the

fuel, lights, and care of the recitation and other public rooms, viz: Seven dollars for the fall session, five dollars for the winter and five dollars for the spring. This is the only charge made to pupils who do not room in the college. The charges to those who room in the college are as follows:

<i>Fall Session.</i> —Incidentals,	\$7 00
Room-rent, fuel, furniture and light,	12 50
<i>Winter Session.</i> —Incidentals,	5 00
Room-rent, fuel, light and furniture,	15 50
<i>Spring Session.</i> —Incidentals,	5 00
Room-rent, fuel, light and furniture,	9 00

The charge for room-rent, fuel and furniture and light is made on the basis of two persons to each room. In cases where a student rooms alone he will be charged five dollars and fifty cents additional per session.

By a resolution of the board of trustees, each student, before he is permitted to enter his name upon the college roll, is required to pay an amount sufficient to cover all his college bills for the current session, besides a special deposit of five dollars as a security against general damages; or, in case he cannot pay immediately, to give a note, with sufficient security, for the payment at some future time, unless excused by the executive committee.

Laboratory Expenses.—Students in the laboratories pay a small charge for the outfit; also, for apparatus destroyed and material consumed by them.

Boarding.—The college does not maintain a boarding hall, and most students depend upon the boarding houses in the vicinity, the regular charge being three dollars per week. The college offers special facilities to the college boarding clubs, which supply their members, now numbering about sixty, with good boarding at about two dollars and a-half per week.

Furniture.—The furniture provided for students who room in the building consists of a bedstead, mattress, table, washstand and chair. The student provides all other articles, including pillow, bedding, wash bowl and pitcher, mirror, etc. The dormitories have been newly supplied with bedsteads (with woven-wire mattresses) and mattresses.

Uniform.—Each cadet is required to provide himself with a uniform, the coat and cap of dark blue cloth, the pantaloons of light blue. The entire suit is exceedingly neat and serviceable, and may be worn on any occasion. Measures are taken at the college, and orders filled by Wanamaker & Brown, Philadelphia. The uniform for cadets costs, at present, \$14.65, \$18.55, or \$21.05, according to the quality selected, and must be paid for when ordered.

Music.—Instruction on the piano or organ is given at the rate of ten dollars for twenty lessons, and three dollars per quarter for use of instrument in practicing.

Washing is at the rate of fifty cents per dozen.

Books and Stationery can be procured at stores in the village at Philadelphia retail prices.

Damages.—Persons causing special damages will be required to pay for the same. General damages will be assessed upon the body of students.

All remittances should be made to the President, State College, Centre county, Pa., by draft, or by money order drawn on State College postoffice.

SESSIONS AND VACATIONS.

The college year is divided into three sessions:

The Fall Session of about fourteen weeks, beginning on the second Wednesday of September, and ending on the third Friday of December; the Winter Session of twelve weeks, and the Spring Session of twelve weeks.

Vacations.—The winter vacation is three weeks, the spring, one, and the summer, ten.

ADMISSION TO COLLEGE.

Examination for admissions are held on Tuesday of Commencement week, and on the day before the opening of the Fall Session, the dates being, next year (1891), the 30th of June and the 8th of September, respectively. It is desirable, on every account, that candidates be present on one or both of these days. Those who cannot do so will be examined at any time during the year, and admitted to the class for which they are found prepared.

In all cases, the applicant for admission must present evidences of good character, and when coming from another college, of honorable dismissal.

For admissions to the freshman class, candidates (of either sex) must be at least fifteen years of age, and pass a satisfactory examination in the following subjects:

1. *For the Courses in General Science, Advanced Agriculture, Civil and Mechanical Engineering, and Physics and Electrotechnics:* English Grammar; Arithmetic; Geography, both Descriptive and Physical; United States History; Higher Algebra, through Quadratics and Progressions; Wentworth's Geometry, four books; and the elements of Natural Philosophy, as much as is contained in Avery, Rolfe and Gillet, or Gage.

2. *For the Latin-Scientific Course:* The same as above, with the addition of four books of Cæsar and four orations of Cicero.

3. *For the General Course in Agriculture:* Robinson's Complete Arithmetic (or its equivalent) to Ratio; English Grammar (Syntax and Etymology); Geography and Spelling.

4. *For the Special Course in Chemistry:* Applicants will be admitted without examination, except in mathematics.

In that branch, at present, the applicant must be fully prepared to pass examination in arithmetic, including the metric system, and the first two hundred pages of Newcomb's Elementary Algebra, or an equivalent; but in order to derive the greatest advantage from the Course it is recommended that students be so far advanced as to have completed the mathematical studies of the freshman year.

5. *For the Course in Mechanic Arts:* The same as for admission to the General Course in Agriculture.

6. *For the Ladies' Course in Literature:* The same as for General Science Course.

7. *For Partial Courses:* Applicants must at least be prepared to enter the freshman class in the branches of study which they wish to pursue.

IN LIEU OF EXAMINATION.

1. *Graduates of State Normal Schools, and of a Select List of High Schools and Academies* in Pennsylvania, whose standard of requirements

has been ascertained to be satisfactory, will be admitted to the freshman class without further examination in studies which, as shown by their diploma or certificate, they have successfully completed in such institution. *Such certificates must show specifically the amount of work done.*

2. *The Holders of Senatorial Scholarships* are admitted on the certificate of the examining committees in the several senatorial districts.

ADVANCED STANDING.

Applicants for Advanced Standing, in any course, must pass a further examination in the studies which have been pursued by the class for which they are candidates.

The Full Courses of Instruction occupy four years, with three terms, or sessions, in each year. The following Schedules of Studies indicate the amount of work required in some of the leading courses, or the equivalent of which will be accepted from candidates for advanced standing.

1. GENERAL COURSE IN AGRICULTURE.

First Year.

FALL SESSION.—Arithmetic (4), Physiology (4), United States History (3), English Grammar (5).

WINTER SESSION.—Algebra (5), United States History (5), English Composition (5).
Practicum.—Zoology, Laboratory Work (5).

SPRING SESSION.—Algebra (5), Botany (5), English Composition (5).
Practicum.—Book-keeping.

Second Year.

FALL SESSION.—Algebra (4), Geometry (2), Natural Philosophy (4), Elements of Agricultural Science (5).

Practicums.—Drawing (4), Horticulture (4).

WINTER SESSION.—Algebra (4), Geometry (2), Natural Philosophy (4), Elements of Agricultural Science (5).

Practicum.—Mechanic Arts (6).

SPRING SESSION.—Algebra (2), Geometry (4), Descriptive Botany (4), Elements of Agricultural Chemistry (5).

Practicums.—Botany (4), Horticulture (4).

Third Year.

FALL SESSION.—Chemistry (5), Horticulture (3), Geometry (2), Mechanics (4).

Practicums.—Chemistry (4), Botany (6).

WINTER SESSION.—Chemistry (3), Geometry (3), Trigonometry (3), Zoology (4).

Practicums.—Chemistry (8), Zoology (6).

SPRING SESSION.—Agricultural Engineering (3), Comparative Physiology (3), Trigonometry and Surveying (5), Mental Science (4).

Practicum.—Chemistry (Quantitative Analysis) (10).

Fourth Year.

FALL SESSION.—Agricultural Chemistry (3), Anatomy and Breeding (4), Botany (4), Political Economy (4), Surveying (1).

Practicums.—Dissection (2), Chemistry (Quantitative Analysis) (4), Surveying (4).

WINTER SESSION.—Agricultural Chemistry (4), Feeding (4), Veterinary Science (3), Constitutional Law (4).

Practicums.—Agriculture (4), Analysis of Agricultural Products (6).

SPRING SESSION.—Fertilizers (4), Entomology (4), Dairy Farming (3), Moral Science (4).

Practicums.—Agriculture (6), Entomology (6).

2. ADVANCED COURSE IN AGRICULTURE.

[The studies of the first two years in this Course are the same as in the General Science or the Latin-Scientific Course.]

Junior Class.

FALL SESSION.—Physics (4), Agricultural Chemistry (3), Cryptogamic Botany (4), Logic (3).

Practicums.—Physics (4), Chemistry (6), Botany (2).

WINTER SESSION.—Physics (4), Agricultural Chemistry (4), Zoology (4), Agricultural Engineering (3).

Practicums.—Zoology (6) or Physics (4), Chemistry (6).

SPRING SESSION.—Mineralogy (1), Mental Science (4), Entomology (2), Fertilizers (4), Crops (1), Zoology (2).

Practicums.—Agriculture (4), Entomology (6).

Senior Class.

FALL SESSION.—Anatomy and Breeding (4), Geology (4), Political Economy (4), Horticulture (3), Crops (2).

Practicums.—Agriculture (5), Dissection (5).

WINTER SESSION.—Geology (2), Constitutional Law (4), Feeding (4), Veterinary (4), Farm Economy (1).

Practicums.—Agriculture (8), Geology (3).

SPRING SESSION.—Dairy (3), Sheep Husbandry (1), Moral Science (4), History of English Literature (3), History of Agriculture (1).

Practicum.—Agriculture (original work), Thesis.

3. GENERAL SCIENCE COURSE.

Freshman Class.

FALL SESSION.—Algebra (4), Geometry (2), German (5), English Language (4).

Practicums.—Drawing (4), English (4).

WINTER SESSION.—Trigonometry (3), Geometry (3), Rhetoric (4), German (5)

Practicums.—Drawing (2), Mechanic Arts (6).

SPRING SESSION.—Trigonometry (5), Physiology (3), German (5), Tactics (2).

Practicums.—First half of session—Physiology (4). Second half of session—Horticulture (4). Drawing all the session (6).

Sophomore Class.

FALL SESSION.—Analytical Geometry (4), Chemistry (5), German or French (2), History (3), Surveying (1).

Practicums.—Surveying (4), Chemistry (4).

WINTER SESSION.—Analytical Geometry (3), Chemistry (3), German (2), French (3), History (4).

Practicums.—Chemistry (8), Mechanic Arts (2).

SPRING SESSION.—Chemistry (3), Botany (4), History (3), French (3), Differential Calculus* (4).

Practicums.—Chemistry (6), Botany (4).

Junior Class.

FALL SESSION.—Physics (4), French (2), German (2), Logic (3), Botany (4) or Integral Calculus (3).

Practicums.—Dynamics (4), Botany (6).

WINTER SESSION.—Physics (4), French (3), Zoology (4), Constitutional History (4).

Practicums.—Physics (4), Zoology (6).

SPRING SESSION.—Physics (4), Mineralogy (1), Mental Science (4), English Literature (4), Zoology (2).

Practicums.—Physics (4), Mineralogy (6).

* NOTE.—For the Differential Calculus of this session, students preparing for the Course in Agriculture or for that in Natural History may substitute seven hours of practicum in Chemistry.

Senior Class.

FALL SESSION.—Physics (4), Geology (4), Political Economy (4), English Literature (3).

Practicums.—Physics (2), Geology (5).

WINTER SESSION.—Geology (2), Constitutional Law (4), Astronomy (3), History of Civilization (4), Physics (3).

Practicums.—Geology (3), Physics (2).

SPRING SESSION.—International Law (4), Astronomy (3), Moral Science (4), History of English Literature (3).

Practicums.—Original work—elective (5), Thesis or Oration.

4. LATIN-SCIENTIFIC COURSE.

Freshman Class.

FALL SESSION.—Algebra (4), Geometry (2), German (5), Latin, (4).

Practicums.—Drawing (4), English (4).

WINTER SESSION.—Trigonometry (3), Geometry (3), Latin (5), German (4).

Practicums.—Drawing (2), Mechanic Arts (6).

SPRING SESSION.—Trigonometry and Surveying (5), German (2), Latin (4), Physiology (3), Tactics (2).

Practicums.—First half of session—Physiology (4). Second half of session—Horticulture (4). Drawing all the session (4).

Sophomore Class.

FALL SESSION.—Analytical Geometry (4), Chemistry (5), History (3), Latin (2), Surveying (1).

Practicums.—Surveying (4), Chemistry (4).

WINTER SESSION.—Analytical Geometry (3), Chemistry (3), History (4), Latin (3), French (3).

Practicums.—Chemistry (8), Mechanic Arts (2).

SPRING SESSION.—Chemistry (3), Descriptive Botany (4), Differential Calculus* (4), History (3), French (2).

Practicums.—Chemistry (6), Botany (4).

[The studies of the last two years in this course are the same as in the General Science Course.]

5. ADVANCED COURSE IN CHEMISTRY.

[The studies of the first two years in this course are the same as in the General Science or the Latin-Scientific Course.]

Junior Class.

FALL SESSION.—Chemistry, *Remsen's Theoretical* (4), *Fresenius' Quantitative Analysis* (2), Physics (4), Integral Calculus, *Bowser's* (3).

Practicums.—Dynamics (4), Chemistry (10).

WINTER SESSION.—Chemistry, *Remsen's Theoretical* (5), *Fresenius' Quantitative Analysis* (1), Physics (4).

Practicums.—Physics (4), Chemistry (16).

SPRING SESSION.—Chemistry, *Organic, Lectures* (3), Physics (4), Mineralogy (1), Mental Science (4).

Practicums.—Physics (4), Chemistry (3) Mineralogy (6).

Senior Class.

FALL SESSION.—Chemistry, *Remsen's Organic* (2), *Chemical Technology Conferences* (4), Geology, *Dana's* (4), Political Economy, *Walker's* (4).

Practicums.—Chemistry (12).

WINTER SESSION.—Chemistry, *Remsen's Organic*, Urinary Analysis and Toxicology (4), *Plant-Chemistry, Lectures* (3), Constitutional Law, *Cooley's General Principles* (4).

Practicum.—Chemistry (18).

SPRING SESSION.—Chemistry, *Remsen's Organic* (3), *Animal Chemistry, Lectures* (3), International Law, *Woolsey's* (4).

Practicum.—Chemistry (20), Thesis.

*NOTE.—For the Differential Calculus of this session, students preparing for the Course in Agriculture or for that in Natural History may substitute seven hours of practicum in Chemistry.

6. COURSE IN CIVIL ENGINEERING.

[The studies of the first two years in this course are nearly the same as in the Course in Mechanical Engineering.]

Junior Year.

- FALL SESSION.—Physics (4), Descriptive Geometry, Maps (Shades and Shadows, Perspective) (4), Integral Calculus (3), Surveying (Topographical, Hydrographical and Mining) (3), Least Squares (1).
Practicums.—Rational Mechanics (4), Railroad Surveying (4), Draughting (2).
 WINTER SESSION.—Applied Mechanics (Analytical and Graphical Statics) (4), Physics (4), Practical Astronomy and Geodesy (3), Engineering Structures (Bridges, Roofs and Arches) (4).
Practicums.—Draughting (6), Physics (4).
 SPRING SESSION.—Applied Mechanics (Kinematics and Kinetics) (4), Physics (4), Materials of Engineering (3), Mineralogy (1). Engineering Structures (Piers, Retaining Walls and Embankments) (3).
Practicums.—Geodesy (4), Mineralogy (6).

Senior Year.

- FALL SESSION.—Engineering Structures (Canals, Foundations and Tunnels) (3), Sewerage and Drainage (2), Specifications and Contracts (2), Geology (4), Political Economy (4).
Practicums.—Topographical Surveying (6), Geology (4).
 WINTER SESSION.—Designing (4), Heat, Steam and Steam Engines (4), Constitutional Law (4), Astronomy (3).
Practicums.—Draughting (6), Model Construction (4).
 SPRING SESSION.—Hydraulic Engineering (3), Electric Motors (3), Economics of Roads and Railroads (2), Hydraulic Motors (3), International Law (4).
Practicums.—Draughting and Thesis (10).

7. COURSE IN MECHANICAL ENGINEERING.

Freshman Class.

- FALL SESSION.—Algebra (4), Geometry (2), German (5), English Language (4).
Practicums.—Drawing (4), Carpentry (4).
 WINTER SESSION.—Trigonometry (3), Geometry (3), Rhetoric (4), German (5).
Practicums.—Drawing (2), Carpentry (6).
 SPRING SESSION.—Trigonometry (5), Physiology (3), German (5), Tactics (2).
Practicums.—Wood Turning (4), Drawing (4).

Sophomore Class.

- FALL SESSION.—Analytical Geometry (4), Chemistry (5), German or French (2).
 History (3), Surveying (1).
Practicums.—Surveying (4), Chemistry (4).
 WINTER SESSION.—Analytical Geometry (3), Chemistry (3), German (2), French (3), History (4).
Practicums.—Chemistry (8), Patternmaking (2).
 SPRING SESSION.—Mechanism (4), History (3), Differential Calculus (4), Descriptive Geometry (4).
Practicums.—Drawing (6), Mechanic Arts (4).

Junior Class.

- FALL SESSION.—Physics (4), Integral Calculus (3), Descriptive Geometry (4), Mechanics of Machinery (4).
Practicums.—Mechanical Drawing (4), Dynamics (4).
 WINTER SESSION.—Analytical Mechanics (3), Method of Least Squares (2), Physics (4), Descriptive Geometry (3), Integral Calculus (2).
Practicums.—Mechanical Drawing (5), Shop-work (5).
 SPRING SESSION.—Analytical Mechanics (3), Properties of Materials (3), Differential Equations (3), Physics (4).
Practicums.—Mechanical Drawing, (4), Shop-work (4), Mineralogy (4).

Senior Class.

FALL SESSION.—Quaternions (4), Political Economy (4), Valve Gearing and Experimental work with Indicators and Inspirators (3), Geology (4).
Practicums.—Mechanical Drawing (6), Shop-work (6).

WINTER SESSION.—Quaternions (3), Mechanics of Engineering (4), Constitutional Law (4), Astronomy (4).

Practicums.—Mechanical Drawing (6), Shop-work (6).

SPRING SESSION.—Astronomy (4), Machine Designing (4), Imaginaries (3), Steam Engine (3).

Practicum.—Drawing. Thesis.

8. COURSE IN PHYSICS AND ELECTROTECHNICS.

[The studies of the first two years in this course are nearly the same as in the Course in Mechanical Engineering.]

Junior Year.

FALL SESSION.—Physics (4), Integral Calculus (3), Descriptive Geometry (4), Logic (3), or Higher Surveying (2), Least Squares (2).

Practicums.—Electrical Measurements (6), Kinematics (4).

WINTER SESSION.—Physics (4), Practical Electricity (3), Applied Mechanics (4), Constitutional History (4).

Practicums.—Physical Measurements (4), Constructing and Calibrating Electrical Instruments (6).

SPRING SESSION.—Physics (4), Applied Mechanics (4), Practical Electricity (3), Quaternions (4).

Practicums.—Electrical Measurements (4), Standard Research (6).

Senior Year.

FALL SESSION.—Theory of Electricity (4), Dynamo-Electric Machinery (3), Geology (4), Political Economy (4).

Practicums.—Light and Heat (4), Electrical Tests (6).

WINTER SESSION.—Theory of Electricity (2), Dynamo-Electric Machinery (4), Steam Engine (4), Abstracts (4).

Practicums.—Constructing and Calibrating Instruments, Electrical Installations and Tests.

SPRING SESSION.—Electric Light and Power (3), Practical Astronomy (3), International Law (4), Mental Science (4).

Practicum.—Thesis Work.

9. SPECIAL COURSE IN CHEMISTRY.

First Year.

FALL SESSION.—General Chemistry (4), Mathematics (5), German (5).

Practicum.—Laboratory Practice.

WINTER SESSION.—Chemistry (4), Mathematics (5), German (5).

Practicum.—Qualitative Analysis.

SPRING SESSION.—Chemistry (3), Mineralogy (1), Mathematics (5), German (5).

Practicums.—Qualitative Analysis and Determinative Mineralogy.

Second Year.

FALL SESSION.—German (2), Mathematics (4), Chemistry, with Quantitative Analysis.

WINTER SESSION.—German (2), Mathematics (4), Chemistry, with Quantitative Analysis.

SPRING SESSION.—Mathematics (4), Chemistry, with Quantitative Analysis. Thesis.

THE PREPARATORY DEPARTMENT.

This department is intended to furnish instruction to persons well trained in the elementary common school branches, and yet not fully prepared for admission to the freshman class. It does not, however, offer instruction in the primary branches, nor is it in any sense a High School. The studies are arranged chiefly with reference to their importance in preparing students for one of the regular college courses.

Special care is taken to make the instruction systematic and thorough, that the foundation for future study may be securely laid.

Students in this department, except those who are under the immediate care of their parents or guardians, are required to room in that part of the building assigned to the department. Here they are under the personal supervision of the principal of the department and his assistants.

In addition to the regulations governing the college students, they are required to observe study hours. During such periods they must neither pay nor receive visitors; and every effort is made to train them to habits of close attention and to correct methods of study. At other times than in recitation and study hours, they have ample opportunity for healthful sports and recreation.

ADMISSION.

First Year.—All applicants for admission must be at least fourteen years of age, and be prepared, at the beginning of the autumn session, to pass a satisfactory examination in the following branches:

Arithmetic.—Thompson's Complete (or its equivalent) to Ratio; English Grammar, Wells' (or its equivalent), to page 102, which includes Etymology.

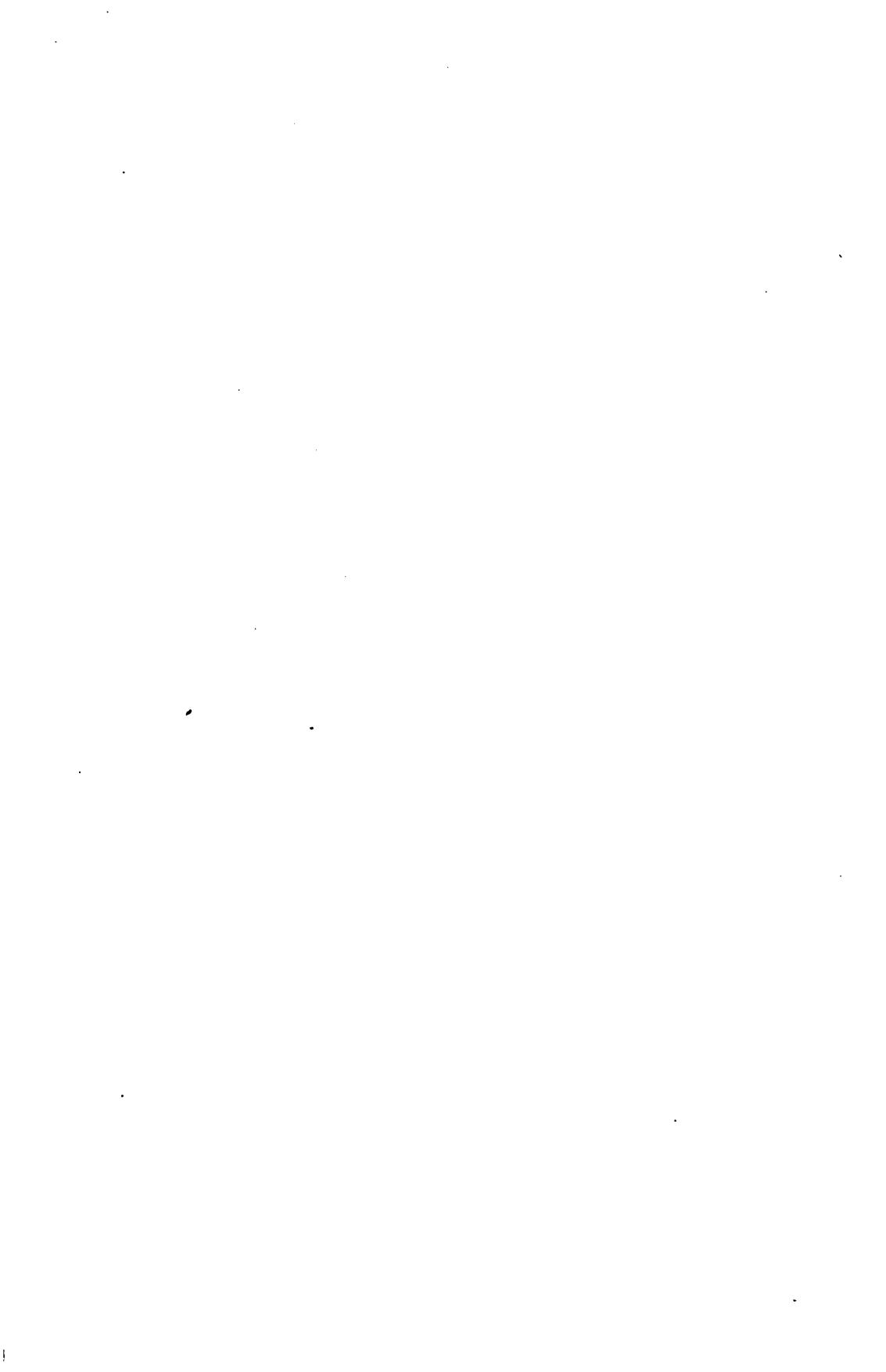
In Geography, Spelling, Reading and Penmanship, the examination must show such acquaintance with those branches as not to require further instruction in them.

Second Year.—Those who apply for admission to the autumn session of the *Second Year* must be prepared to pass, in addition to the above, an examination on all the work of the *First Year*.

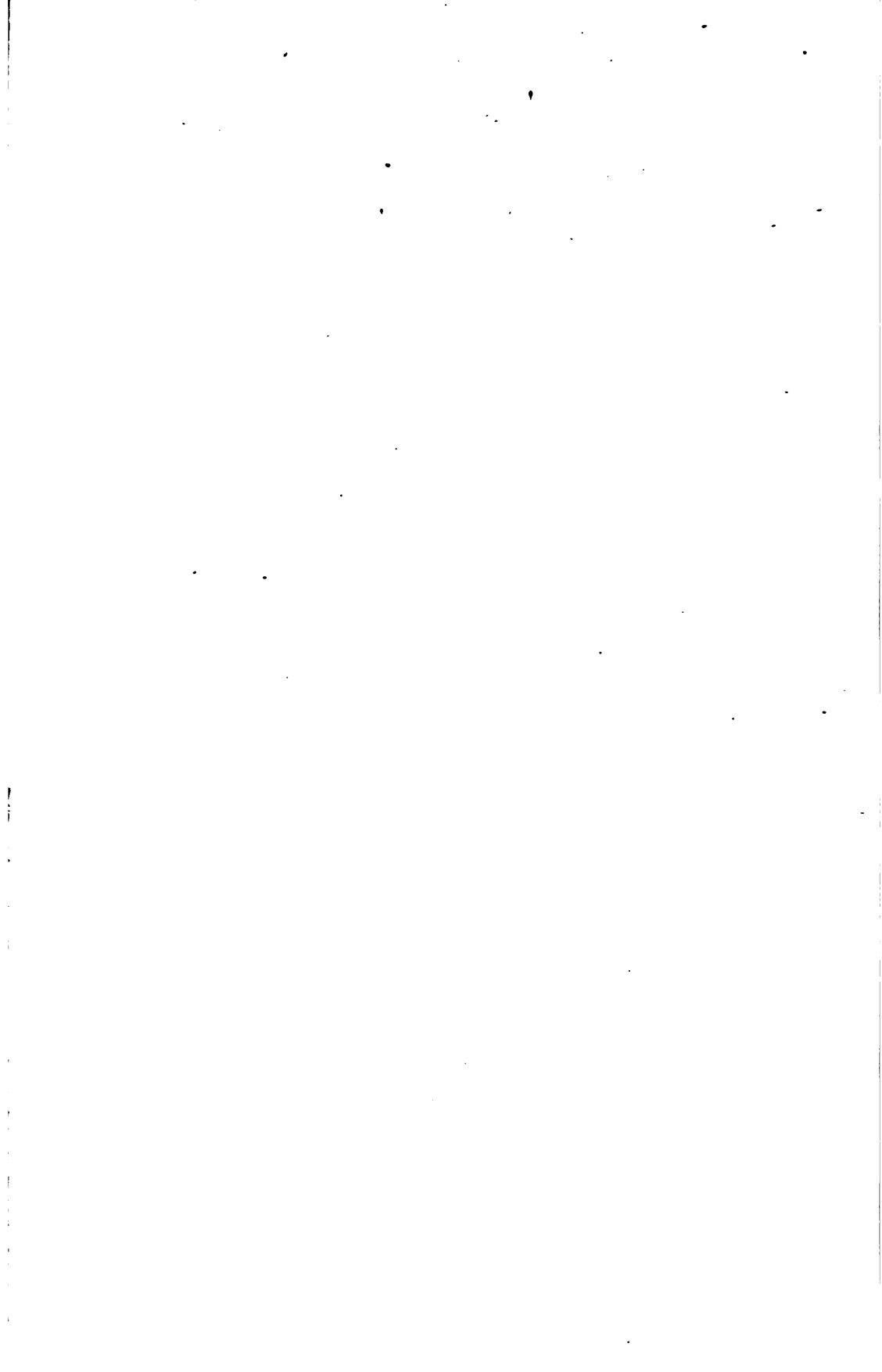
All persons entering classes after the opening of the first session will be required to pass an examination in the work already gone over by the class into which they seek admittance.

Tuition in this department is free; other charges are the same as in the college proper.

Examination for Admission, Tuesday, September 18, 1891, at nine o'clock A. M.









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